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March 1989

MacUser

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A Micro

Editor's Corner

By B. R. Ross

Mike
This is what
I've been
talking
about.
It's HOT!!
-P

Fasten your seatbelts, Mac® fans. You're about to enter the Microsoft Zone.

Earlier this week I witnessed a demo of Microsoft's products that left me feeling as enlightened as the day I first set my eyes on a Macintosh®.

Here's a company with a reputation for singularly superior products. But what they showed me pushed the envelope of software productivity:

A complete line of products for the Mac that *all work together*.

The significance of which hit me like a ton of bricks when I saw them in action.

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Obviously, I'm impressed. So much so, that I've asked Microsoft to send copies of their Macintosh product line brochure in time for our next meeting. If you can't make it, you can always get a free copy by calling (800) 541-1261, Dept. I92.

Fellow Macphiles, man your Macs. Because we're entering a new age of compatibility—or at least Microsoft is.

And I don't know about you, but I plan on going along for the ride.

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Moof!

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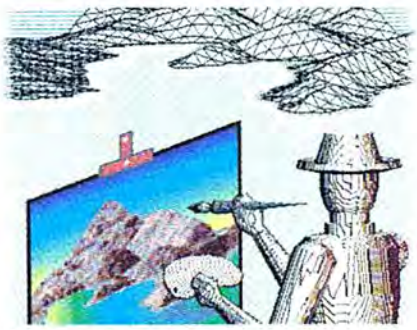
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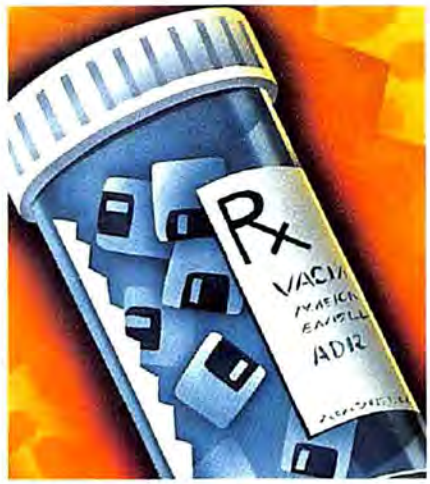


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MacUser is always looking for new and unusual products for our New on the Menu, News Line!, Quick Clicks, and Scrapbook sections, as well as for feature coverage. If you've got a product that you'd like to tell us about — whether it's new or an upgrade — send your letters and/or press releases to: Michele Stokol, Editorial Assistant, *MacUser* Magazine, 950 Tower Lane, 18th floor, Foster City, CA 94404.

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Although we can't offer any telephone assistance, *MacUser* welcomes your technical questions. If you've got a Mac question or problem, send it to Chris Espinosa, The Help Folder, c/o *MacUser* Magazine, 950 Tower Lane, 18th floor, Foster City, CA 94404. Chris works for Apple, and if he can't give you an answer himself, he'll find someone who can. Because of the volume of mail we receive, we can't answer all of your questions so we also recommend that you take advantage of your local user groups. You can find the one nearest you by calling Apple toll-free at: (800) 538-9696, ext. 500.

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We love to get tips and hints (on disk, please) from our readers. Any tips should be sent to The Tip Sheet, c/o *MacUser* Magazine, 950 Tower Lane, 18th floor, Foster City, CA 94404. We can't print every tip, but we try our best to pick the most interesting and representative ones for publication. We're also interested in hearing from any programmers who are interested in contributing to our utilities disk series or labs benchmark disk series. If interested, contact Michele Stokol, at the same address.

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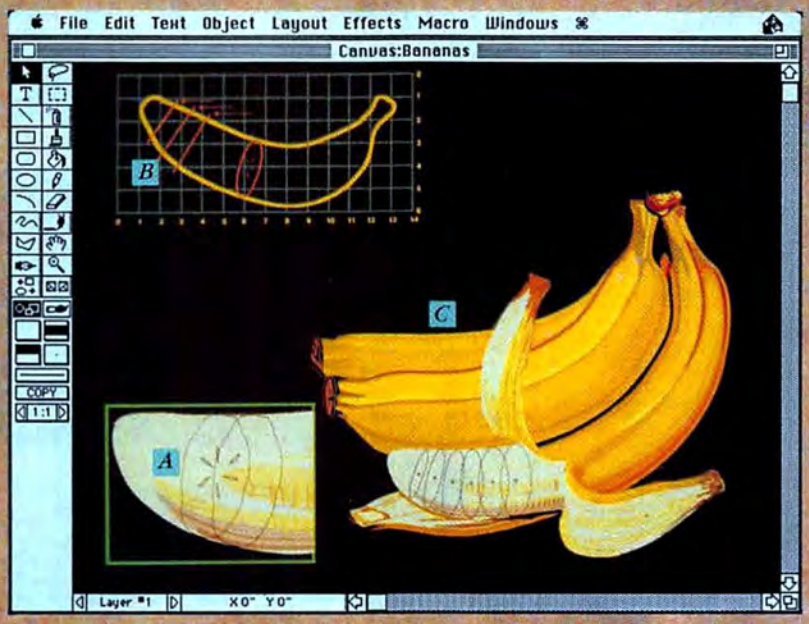
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A To an architect, fine hairlines like ours are pure poetry.

B Auto-tracing built this banana from a scanned-in produce ad. In split seconds.

C Multi-point bezier curves make drawing a bunch easier. Colors are added in layers.

D Auto-resizing helped this V.P. of Sales display the fruits of his labor, graphically.



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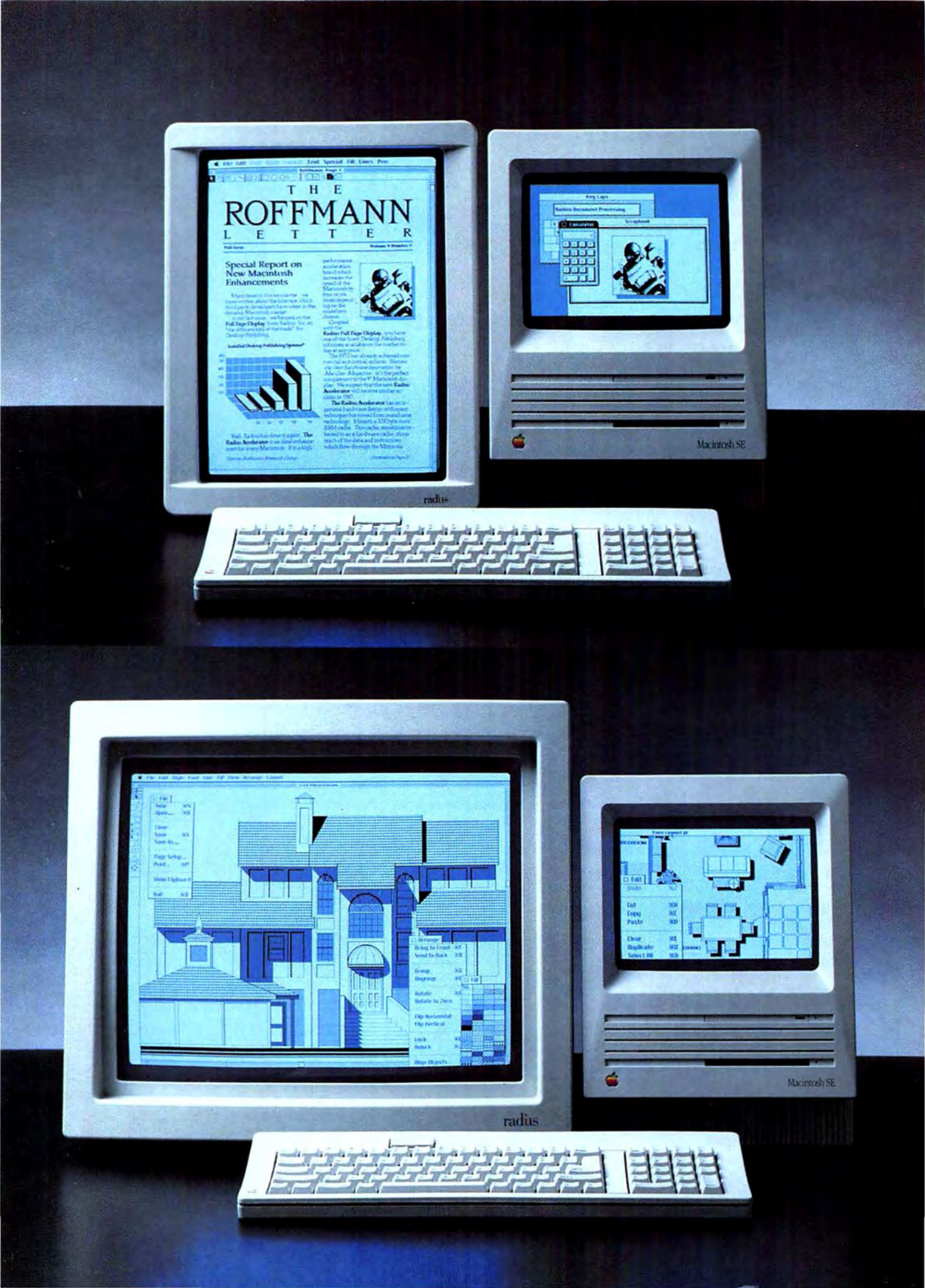
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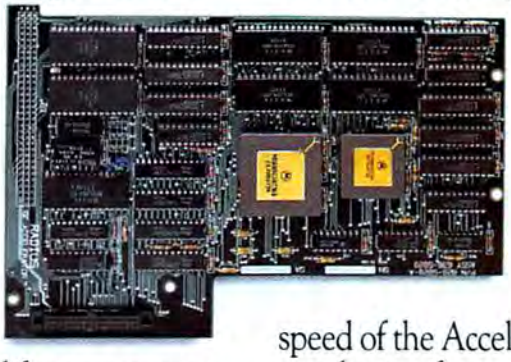

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A Wild-Goose Chase?



By Frederic E. Davis

"Reality — what a concept!" Sometimes there's more truth in comedy than comedy in truth. Take desktop presentations — please! Desktop *publishing* was the goose that laid the golden egg at a tense point in Apple's history. Desktop *presentations*, Apple's buzzword du jour, is its latest attempt to find (or invent) another goose to lay another golden cash cow. Since it's new, it's presumably more important and interesting.

Interesting maybe. But important? Apple is pinning its hopes on desktop presentations, but I wonder if the company isn't placing too much emphasis on it. At a time when the folks at Apple can hardly keep up with the company's own rate of growth, they need to stay very focused on their primary goals — and reality.

About a year ago, when desktop-presentation products were first introduced, Apple held a big press conference at the Seybold desktop publishing shindig, and John Sculley proclaimed that desktop presentations represented a bigger potential market than desktop publishing. After the press conference, I spoke with Sculley and asked him whether that proclamation wasn't a bit overstated.

I argued that judging market size by how much money is being spent, rather than by how many people are doing something, is far more important. By that measure, the publishing market is way ahead of presentations. In the total market area Apple serves, publishing is a more than $100-billion-a-year industry, and the printing-and-publishing industry employs more people than any other in the United States. A $10,000 Mac-based desktop-publishing system will be embraced if it provides 90 percent of the functionality of a $100,000 system for only 10 percent of the cost. But the nascent presentations market is dominated by commodity products such as $100 slide projectors, $1 overheads, and 79¢ felt-tip pens. The Mac solution for desktop publishing generally saves money, but the Mac alternative for desktop presentations usually means putting out more — not less — money than the old-fashioned approach. If you already have the Mac hardware, the software can be pretty useful and cost-effective. But Mac-based presentations don't offer a compelling bottom-line motivation to buy the hardware in the first place, as desktop publishing does.

Desktop-presentation products are still much less developed than their DTP counterparts, while publishing products are fairly well focused on accomplishing specific publishing tasks such as page layout, drawing, image processing, and typography. The presentation products are less well defined. Theoretically, presentation products should address two main concerns: helping you create your presentation and helping you give your presentation. Most of the current crop of software products try to do some of both by combining outlining and display capabilities, but I think they offer more help with giving your presentations than with preparing them. A good presentation should avoid putting too much text on a slide. Let's face it: You don't listen to the presenter as well when you're trying to read a lot of words quickly. Yet that's just what the current batch of presentation products focuses on: bullet charts. Slides should be visual aids, not reading matter. What presenters need help with is learning to express ideas and emotions graphically; that's something no current program even tries to do.

Using some of the current presentation packages, you can turn your Mac into a rather sophisticated multimedia presentation machine, although the software hasn't reached the point where creating a multimedia presentation is as easy as showing some slides. And although most programs have good tools for the visual part of the presentation, not many pay much attention to the audio, such as voice-overs, sound effects, or music.

Which isn't to say that these things aren't coming. I'll be amazed if I don't get bags of mail from angry developers who've done just that. But at least for the moment, off-the-shelf multimedia presentations on the Mac are a thing of the future.

At least for the moment, off-the-shelf multimedia presentations are a thing of the future.

And ultimately, Apple's commitment to desktop presentations may turn out to be more smoke and mirrors than reality. In spite of Sculley's avowed confidence, Apple already seems to be backing away from a field that it

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thought would lead to the stars. Instead, the new buzzword is *multimedia*, an area that's even more nebulous than presentations. Seen any "multimedia" software lately?

Innovation and new ideas are what keep healthy companies healthy. But throwing everything behind the latest craze at the expense of what's already made you successful is like a Super Bowl–champion team giving up practices because it's already won it all.

Overemphasizing desktop presentations could be dangerous because it takes valuable marketing, technology, and human resources away from the broader market of desktop publishing. It would be wiser for Apple to portray desktop presentations as part of desktop publishing; this strategy would play off Apple's well-established position as the technology leader in desktop publishing, and it would keep marketing energy focused on the really big prize: publishing.

And when you get right down to it, desktop presentations really is part of desktop publishing. Desktop publishing involves combining typography and graphics to create pages, ads, and other printed materials. And that's just what desktop presentations are all about, except that you show the material to people instead of letting them read it. Presentations and publishing are ultimately much more alike than they are different.

Desktop publishing gave Apple its first taste of credibility in the business market (and on Wall Street) and made a lot of money (for Apple and other companies, including, to Apple's chagrin, IBM). To keep its sales growing, Apple felt it had two choices: get the goose to lay more golden eggs or find another goose. It seems to have opted for the second-goose approach, and what it's come up with — desktop presentations — could turn out to be a real goose egg. It's time to wake up and smell the eggs and to realize that they (like me) are mixing metaphors. They don't need to try to convince the public to buy into a whole new egg; they need to realize that desktop publishing, desktop presentations, and multimedia technology are all just pieces of a bigger egg.

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SOFTWARE

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CP denotes copy-protected.
NCP denotes not copy-protected.

Aatrix Software ... NCP

3976 Aatrix Payroll 3.05 ... $99.
4020 Aatrix TimeMinder 1.7 ... 109.
3958 Aatrix Payroll PLUS 3.02 ... 159.

Abacus Concepts ... NCP

4482 StatView SE + Graphics 1.03 ... 229.
4481 StatView II 1.03 ... 349.

Access Technology ... NCP

3959 MindWrite 2.0 ... 95.
4109 MindWrite*Express* 2.0 ... 145.



LaCie ... NCP

Silverserver 1.1—Powerful server utility lets local and remote users share hard drives and modems. Also provides complete hard disk management, fast disk duplication and network chatter. **$92.**

1346 Trapeze 2.1 ... 155.

Acius ... NCP

1010 4th Dimension 1.0.6 ... 469.
4024 4th Dimension Runtime ... 235.

Adobe Systems ... NCP

1137 Adobe Illustrator '88 1.6 ... 309.
1138 The Collector's Edition ... 79.
1142 Newsletters/Publishing Pack 1 ... 255.
4565 Forms and Schedules Pack 2 ... 309.
4566 Presentations Pack 3 ... 309.

MacConnection carries the entire Adobe Type Library (volumes 1-69). Listed below are Adobe's newest typefaces at press time.

4567 57 ITC Kabel ... 127.
4568 58 OCR A, OCR B, MICR ... 97.
4569 59 Helvetica #1 ... 127.
4570 60 Helvetica #2 ... 187.
4571 61 Helvetica #3 ... 187.
4572 62 Times Ten ... 127.
4573 63 Kaufmann ... 97.
4574 64 Clarendon ... 97.
4575 65 Peignot ... 97.



SuperMac Software ... NCP

Sentinel 2.0—Keep confidential files private—conveniently. Sentinel will encrypt and secure your files over 100 times faster than competing Macintosh encryption software ... **$155.**

4576 66 New Caledonia ... 257.
4577 67 ITC Clearface ... 257.
4578 68 Americana ... 127.
4579 69 ITC Serif Gothic ... 187.

Affinity Microsystems ... NCP

1014 Affinifile 1.1 ... 46.
1016 Tempo II 1.0 ... 89.

Aldus ... NCP

1330 Freehand 2.0 ... 349.
1331 PageMaker 3.01 ... 399.

Altsys ... NCP

1194 FONTastic Plus 2.01 ... 54.
1195 Fontographer 2.4.1 *(CP)* ... 239.

Apple Computer ... NCP

1118 HyperCard 1.2.1 ... 42.

Ars Nova ... NCP

1215 Practica Musica 2.07 ... 75.

Ashton-Tate ... NCP

1323 FullPaint 1.0SE ... 69.
4098 Full Impact 1.0 ... 249.
1324 FullWrite 1.0 ... 269.
1322 dBASE Mac 1.0 ... 295.

Berkeley System Design ... NCP

1541 Stepping Out II 2.01 ... 52.

Beyond, Inc. ... NCP

4203 MenuFonts 2.02 ... 30.

Blyth ... NCP

1470 Omnis 3 Plus/Express 3.25 ... 129.
4318 Omnis 3 Plus/Express 3.3 *(3 users)* 399.

Bogas Productions ... NCP

1461 Studio Session 1.2SE ... 49.
4255 Super Studio Session 1.0 ... 75.
1458 Country Disk ... 15.
1459 Heavy Metal Disk ... 15.
1460 String Quartet Disk ... 15.

Borland International ... NCP

1512 Turbo Pascal Tutor 1.0 ... 46.
1511 Turbo Pascal 1.1 ... 68.
1507 Numerical Methods Toolbox ... 68.
1510 Sidekick 2.0 ... 68.
1506 Eureka: The Solver 1.0 ... 133.
1508 Reflex Plus 1.01 ... 189.

BrainPower ... NCP

1532 DataScan 1.0 ... 118.
1535 DesignScope 1.15 ... 128.
1534 MathView Professional 1.0 ... 144.
1537 StatView 512+ 1.2 ... 175.
3960 ArchiText 1.03 ... 182.

4066 The Analyzer Bundle *(includes DataScan, DesignScope, and StatView 512+)* ... $325.

Bravo Technologies ... NCP

1539 MacCalc 1.2D ... 79.

Bright Star Technology ... NCP

1402 Alphabet Blocks 3.01 ... 32.
3961 Talking Tiles 1.0 ... 69.
3962 HyperAnimator 1.5 *(includes Stax, a MacConnection exclusive!)* ... 79.

Broderbund Software ... NCP

4314 Type! 1.0 ... 20.
1423 Jam Session 1.1 *(CP)* ... 30.
1427 Print Shop 1.3 ... 36.
4065 PosterMaker Plus 2.5 ... 36.
4465 DTP Advisor 1.0 ... 47.
1422 Geometry 1.0 *(CP)* ... 59.
1426 Physics 1.1 *(CP)* ... 59.
4067 Calculus 1.0 *(CP)* ... 59.
4501 Drawing Table 1.0 ... 78.
4291 Clip Animations ... 36.
4110 Clip Sounds *(sound effects/music)* ... 36.
1430 VideoWorks II HyperCard Driver 1.2 60.
1432 VideoWorks II Accelerator 1.1 ... 118.
1431 VideoWorks II 2.0 ... 118.

Caere ... NCP

4476 OmniPage 1.0 ... 565.

CAMDE ... NCP

1635 Nutri-Calc Plus 1.1 ... 169.

Casady & Greene ... NCP

2269 QuickDEX 1.4A ... 32.
1575 Fluent Fonts 2.0 ... 27.

FLUENT LASER FONTS

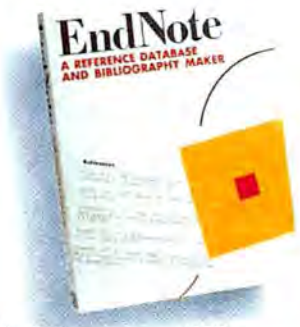
1576 Bodoni (V1) ... 46.
1587 San Serif (V2) ... 46.
1588 Ritz/Right Bank (V3) ... 46.
1589 Monterey (V4) ... 46.
1590 Regency Script/Calligraphy (V5) ... 46.
1591 Preluce Script (V6) ... 46.
1592 Coventry Script/Zephyr (V7) ... 46.
1593 Gregorian/Dorovar (V8) ... 46.
1594 Cyrillic (V9) ... 46.
1577 Bodoni Ultra (V10) ... 46.
1578 Sans Serif Bold (V11) ... 46.
1579 Sans Serif Extra Bold (V12) ... 46.
1580 Gatsby Light (V13) ... 46.
1581 Micro (V14) ... 46.
1582 Micro Extended (V15) ... 46.



SoftView ... NCP

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1583	Galileo Roman (V16)	46.
1584	Campanile-Giotto (V17)	46.
1585	Alexandria (V18)	46.
1586	Jott Casual (V19)	46.
4204	Gazelle & Kells Meath (V20)	46.
4205	Paladin & Abalene (V21)	46.
4206	Collegiate (V22)	46.
	CE Software ... NCP	
1727	CalendarMaker 3.0	27.
1728	Disktop 3.04	27.
4689	MockPackage Plus Utilities 4.4	27.
1729	QuicKeys 1.1	53.
3963	QuickMail 1.05	159.
	Challenger Software ... NCP	
1610	Mac3D 2.1	119.
	Chang Labs ... NCP	
1613	Rags to Riches Ledger 3.1	120.
1617	Rags to Riches Receivables 3.1	120.
1614	Rags to Riches Payables 3.1	120.
1622	Rags to Riches 3-Pak	289.
1611	C.A.T. 2.0	229.
1615	Professional Billing 2.9	239.
1612	Inventory Control 2.6	239.
1616	Professional 3-Pak	359.
1618	Retail Business 3-Pak	359.
	Claris ... NCP	
1123	MacPaint II 2.0	102.
1129	MacWrite 5.0	102.
4196	FileMaker II 4.0	237.
1117	MacDraw II 2.0	325.
1125	MacProject II 2.0	395.
	Coda Music Systems ... CP	
4367	MacDrums 1.01	32.
4483	Perceive 1.0 *(NCP)*	52.
	Cricket Software ... NCP	
1669	Pict-O-Graph 1.0	89.
4346	Cricket Paint 1.0	99.
1668	Cricket Graph 1.3	119.
1667	Cricket Draw 1.1	169.
1670	Cricket Presents 2.0	$289.
	Dac Software ... NCP	
4502	Dac-Easy Light 1.0	44.
	DataViz ... NCP	
1823	MacLink Plus 3.0	145.
	Davidson ... CP	
1734	Math Blaster! 1.0	27.
	Deneba Software ... NCP	
1770	Merriam-Webster's Thesaurus 2.0	35.
4700	BigThesaurus *(1.4 million words!)*	54.
1767	Comment 2.0	54.
1768	Coach Professional 3.0A	105.
1769	Canvas 2.0	159.
	DreamMaker ... NCP	
4115	MacGallery *(HyperCard format)*	28.
4088	MacGallery *(MacPaint format)*	28.
	Dubl-Click Software ... NCP	
1824	Calculator Construction Set 1.04	36.
3972	World-Class Fonts! Originals (1-2)	45.
3973	World-Class Fonts! The Stylish (3-4)	45.
3974	World-Class Fonts! The Giants (5-6)	45.
3964	WetPaint Classic Clip-Art (1-2)	45.
3965	WetPaint For Publishing (3-4)	45.
3966	WetPaint Animal Kingdom (5-6)	45.
3967	WetPaint Special Occasions (7-8)	45.
3968	WetPaint Printer's Helper (9-10)	45.
3969	WetPaint Industrial Revolution (11-12)	45.
3970	WetPaint Old Earth Almanac (13-14)	45.
3971	WetPaint Island Life (15-16)	45.
	Electronic Arts ... NCP	
1543	Thunder! 1.1 *(Batteries Included)*	30.
1843	Disk Tools Plus 1.01	31.
4619	Mavis Beacon Typing 1.2B	35.
1846	Deluxe Music Construction Set 2.0	61.
4315	Studio/8 1.0	319.
3941	SmoothTalker 2.0	33.
3940	First Shapes	33.
3936	KidTalk	33.
3939	MathTalk	33.



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Quicken 1.01—Complete, easy-to-use personal and small business accounting software. Automates check writing, budgeting, tax recordkeeping, and more. Now links direct to MacIntax. . . . . $33.

3938	MathTalk Fractions	$33.
3935	Speller Bee	33.
	Enzan-Hoshigumi USA ... NCP	
1879	MacCalligraphy 2.0	99.
1880	Year of the Dragon	21.
1881	Japaneze Clip Art Scroll 1 "Heaven"	52.
1882	Japaneze Clip Art Scroll 2 "Earth"	52.
1878	Japaneze Clip Art "Borders" Scroll	65.
	Farallon Computing ... NCP	
4208	Timbuktu 2.0.1	69.
2199	MacRecorder 1.1	135.
4684	ScreenRecorder 1.0	135.
	Fifth Generation Systems ... NCP	
4287	Pyro! 3.0 *(screen saver)*	15.



Microsoft ... NCP

PowerPoint 2.0—Compose complete boardroom-quality presentations. Design and arrange 35mm slides, flipcharts, overheads, etc., all within one program. . . . . $255.

3954	PowerStation 2.5	*special* 29.
3955	Suitcase II 1.2	44.
3953	FastBack Mac 1.03	54.
	Foundation Publishing ... NCP	
2384	Comic Strip Factory 1.6	44.
2385	Comic People	25.
	Fox Software ... NCP	
4195	FoxBASE+/Mac 1.1	208.
4580	FoxBASE+/Runtime 1.1	158.
	Freesoft ... NCP	
2219	Red Ryder 10.3	54.
	FWB Software ... NCP	
2232	Hard Disk Partition 2.0	40.
2231	Hard Disk Util 2.03	53.
4683	Hard Disk DeadBolt 1.0	53.
	Generic Software ... NCP	
4319	Generic CADD Level 1 1.0.1	54.
4411	Flow Charts & Schedules	18.
4402	Home Landscaping	18.
4401	Basic Home Design	35.
4410	Commercial/Residential Furnishings	35.
4400	Heating/Ventilation/Air Conditioning	35.
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2277 TimeMasters 1.0 ..... 22.
2276 KidsTime 1.2 ..... 26.
4334 NumberMaze 1.0 ..... 27.
2270 American Discovery 2.1 ..... 27.
2272 Crystal Paint 1.0 ..... 27.
2273 ConcertWare+ 4.0 ..... 39.
2271 ConcertWare+ MIDI 4.0 ..... 79.

ICOM Simulations ... NCP

4084 On Cue 1.3 ..... 36.
4085 TMON 2.8.1 ..... 89.

Ideaform ... NCP

2419 DiskQuick 2.10 ..... 27.
2418 HyperBook Maker 1.0 ..... 31.
2420 MacLabeler Plus 3.0 ..... 42.

Individual Software ... NCP

4209 Typing Instructor Encore ..... 26.
4491 101 Scripts & Buttons for HyperCard 37.
2943 101 Macros for Excel ..... 37.

Infosphere ... CP

2513 LaserServe 2.0 ..... 62.
2514 MacServe 2.4 ..... 155.
4595 Liaison 1.0A ..... 185.

Innovative Data Design ... NCP

2417 MacDraft 1.2B ..... 149.
4707 Dreams 1.0 ..... 279.
4710 Residential Construction 1.0 ..... 139.

Insignia ... NCP

4089 SoftPC 1.2 ..... 479.

Intuit ... NCP

2425 Quicken 1.01 ..... 33.

Kent Marsh Ltd. ... NCP

2591 The NightWatch 1.02 ..... 89.
2592 MacSafe 1.08C ..... 89.

LaCie ... NCP

4335 Silverserver 1.1 ..... 92.

Layered ... NCP

2613 Insight OneWrite 1.0 ..... 185.
2609 Insight Expert AP 2.02 ..... 459.
2610 Insight Expert AR 2.10 ..... 459.
2611 Insight Expert GL 2.02 ..... 459.
2612 Insight Expert Inventory 2.0 ..... 459.
2614 Insight Expert Time Billing 2.0 ..... 459.

Learning Company ... CP

2670 Reader Rabbit 2.0 ..... 33.

Letraset ... NCP

2621 Ready,Set,Go!4 4.5 ..... 275.
2619 Image Studio 1.5 ..... $279.
4709 LetraStudio 1.0 ..... 289.

Linguist's Software ... NCP

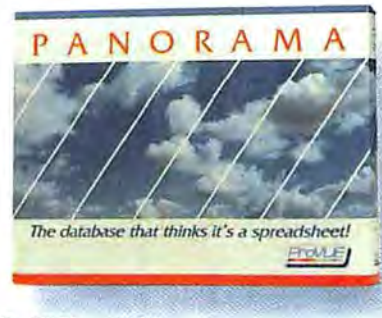
2649 Tech ..... 59.
2643 LaserTech ..... 79.
4681 RSV Bible ..... 79.
4682 Vulgate *(Latin Bible)* ..... 79.

FOREIGN LANGUAGE FONTS

2628 SuperFrench/German/Spanish ..... 39.
2635 MacKana/Basic Kanji ..... 39.
2630 MacGreek ..... 59.
2631 MacHebrew ..... 59.
2636 MacKanji 2.0 ..... 59.
2637 MacKorean ..... 59.
2637 MacThai ..... 59.
2625 MacChinese Cantonese ..... 79.
2626 Cantonese Supplement ..... 39.
2645 MacChinese Mandarin ..... 79.
2646 Mandarin Supplement ..... 39.
2647 Greek/Hebrew/Phonetic ..... 89.

FOREIGN LASER FONTS

2639 LaserFrench/German/Spanish ..... 79.
2640 LaserGreek ..... 79.
2642 LaserKorean ..... 89.
2638 LaserCyrillic ..... 115.



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Panorama 1.0—Database that combines the speed and simplicity of a spreadsheet with powerful forms capabilities. Includes clairvoyance, outlining, Flash Art, charts, and macros. $209.

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2684 WorksPlus Spell 1.1 ..... 46.
2683 WorksPlus Command 1.1 ..... 57.

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4068 Aztec C 3.6B ..... 65.
4316 Aztec C UniTools ..... 65.
4317 Aztec SDB 3.6B ..... 65.
4069 Aztec MPW C 3.6B ..... 99.
4075 Aztec C + SDB 3.6B ..... 99.

MECA ... NCP

2796 Managing Your Money 2.0 ..... 128.

MEDIAGENIC ... NCP

1334 City to City 1.0 ..... 30.
4295 Focal Point/Business Class Bundle .. 48.
4591 Open It! 1.0 ..... 54.
1338 Reports! 1.2 ..... 59.
4638 Focal Point II 1.0 ..... 119.

Microlytics ... NCP

2733 Word Finder 2.0 ..... 33.
2732 GOfer 1.0 ..... 44.

Microseeds Publishing ... NCP

4210 Screen Gems 1.0 ..... 47.
2913 Redux 1.5 ..... 59.

Microsoft ... NCP

4471 QuickBasic 1.0 ..... $69.
2863 Chart 1.02 ..... 79.
2885 Write 1.0 ..... 79.
2866 File 2.0 ..... 129.
2884 Works 2.0 ..... 189.
2865 Excel 1.5 ..... 255.
2882 Word 3.02 ..... 255.
2878 PowerPoint 2.0 ..... 255.
2875 Microsoft Mail 1.36 (1-4 users) ..... 195.
2872 Microsoft Mail 1.36 (5-10 users) ..... 325.
2873 Microsoft Mail 1.36 (11-20 users) .. 489.
2874 Microsoft Mail 1.36 (21-32 users) .. 639.

Miles Computing ... NCP

2768 Orchestra of Fonts Vol. 4 ..... *special* 15.
2771 Mac the Ripper Vol. 3 ..... 32.
2769 Peoples, Places & Things Vol. 5 ..... 32.

Mindscape ... CP

2748 The Perfect Score: SAT 1.0 ..... 46.

Monogram ... NCP

2780 Dollars & Sense 4.1C ..... 81.
2779 Business Sense 1.01 ..... 279.

Niles & Associates ... NCP

4602 EndNote 1.0 ..... 82.

Nolo Press ... NCP

4228 For the Record 1.0 ..... 29.
2981 WillMaker 3.0 ..... 34.

North Edge Software ... NCP

2986 Timeslips III 1.06A ..... 117.

Odesta ... NCP

4211 DataDesk Professional 2.0 ..... 289.
3014 GeoQuery 1.0 ..... 205.
3013 Double Helix II 2.0R51 ..... 339.

Olduvai Software ... NCP

3031 Icon-It! 1.01 ..... 39.
4667 Art Clips *(formerly Post-Art)* ..... 51.
3035 Read-It!TS 1.06 ..... 79.
3030 FontShare 1.01 ..... 149.
3034 Read-It! 2.0 ..... 199.

OWL International ... NCP

3082 Guide 2.0 ..... 99.

Paracomp ... NCP

4664 Milo 1.0 ..... 159.
4597 Swivel 3D 1.0 ..... 249.

PCPC ... NCP

3175 HFS Backup 3.0 ..... 54.

Postcraft International ... NCP

3157 Laser FX 1.6 ..... 114.

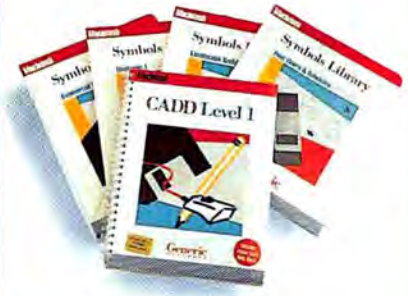


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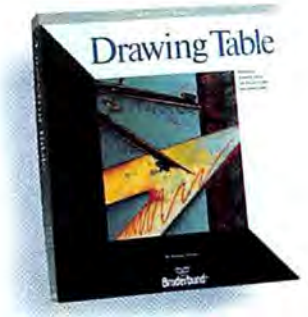
4058	Laser FX Pack I	$29.
4059	Laser FX Pack II	29.
4060	Laser FX Pack III	29.
4061	Laser FX Pack IV	29.
4062	Laser FX Pack V	29.
4063	Laser FX Pack VI	29.
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4310	Wall Street Investor 3.0	469.
	ProVUE Development ... NCP	
4582	Panorama 1.0	209.
	Quark ... NCP	
3230	Quark XPress 2.0	call
4621	QuarkStyle	call
	Rubicon Publishing ... CP	
3272	Dinner At Eight-Encore Edition 1.03	45.
	Satori ... NCP	
3320	BulkMailer 3.22	79.
3321	BulkMailer Plus 3.22	195.
3322	Legal Billing 1.85	369.
3323	Legal Billing II 2.56	539.
3324	Project Billing 1.54	409.



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3978	Components GL 1.0	389.
	Sensible Software ... NCP	
4692	BookEnds 1.0	54.
3375	Sensible Grammar 1.1D	54.
	Silicon Beach Software ... NCP	
3504	Silicon Press 1.1	41.
3508	World Builder 1.0	41.
3506	SuperPaint 2.0	129.
3507	Super3D 1.0	157.
3980	Digital Darkroom 1.0	157.
	Simon & Schuster ... NCP	
4230	*The Fully Powered Mac* Book	24.
3305	Typing Tutor IV 1.2	35.
	SmethersBarnes ... NCP	
1478	Prototyper 1.0	72.
	SoftStyle ... NCP	
3282	Printworks (Dot Matrix) 3.5	43.
3281	Printworks (Daisywheel) 3.0	56.



Broderbund Software ... NCP

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3283	Printworks (HP laser) 3.0	85.
	SoftView ... NCP	
3471	MacInUse 2.0	42.
3981	FormSet Business Forms Edition 1.1	55.
3473	TaxView Planner 2.0 (1988-1992)	64.
3470	MacInTax 1988	65.
	Software Discoveries ... NCP	
3374	Merge Write 1.0	34.
3373	Record Holder Plus 3.0	45.
	Software Ventures ... NCP	
3454	Microphone 1.5	119.
3455	Microphone II 2.0	225.
	Softworks, Inc. ... NCP	
4601	Stack Cleaner	29.
4599	HyperTools #1	59.
4600	HyperTools #2	59.
	Solutions, International ... NCP	
3448	SmartScrap & The Clipper 2.0	46.
3449	SuperGlue 1.05	52.
3446	The Curator 1.05	79.
4308	BackFAX *(reqs. Apple FAX modem)*	129.
	Spinnaker/Hayden ... CP	
2329	SAT Score Improvement 1.0	58.
	Springboard ... CP	
3530	Certificate Maker 2.0	24.
3532	Certificate Maker Library Vol. 1	18.
3531	Early Games	28.
4493	Atlas Explorer	28.
4495	Family Matters	28.
4492	Works of Art Assortment Series	28.
4494	Works of Art Education Series	28.
4496	Works of Art Holiday Series	28.
4498	Works of Art Laser Art Business	59.
4499	Works of Art Laser Fonts Vol. 1	59.
4497	Top Honors	59.
4500	Springboard Publisher 1.0	109.
	SuperMac Software ... NCP	
3383	SuperSpool 5.0	54.
3382	SuperLaserSpool 2.0	82.

3378	Multi-User SuperLaserSpool 2.0	$199.
3377	Diskfit 1.4.1	54.
3379	Network Diskfit 1.4.1	199.
3381	Sentinel 2.0	155.
3380	PixelPaint 1.1	199.
4086	Acknowledge 1.0	329.
	Survivor Software ... NCP	
3289	MacMoney 3.02	62.
	Symantec ... NCP	
3982	MacSQZ! 1.5	49.
3983	S.U.M. 1.02	59.
3422	More II 2.0	225.
4644	Just Enough Pascal 1.0	45.
3421	Lightspeed Pascal 2.0	65.
4645	Lightspeed Pascal/Just Enough Pascal Bundle	87.
3420	Lightspeed C 3.01	95.
	Symmetry ... NCP	
3318	HyperDA 1.1	35.
4504	Acta Advantage 1.0	65.
4160	PictureBase 1.23-WetPaint Bundle	95.
	Synergy ... NCP	
3130	VersaTerm 3.20	65.
3129	KaleidaGraph 1.10	120.
3131	VersaTerm-PRO 3.0	195.
	3G Graphics ... NCP	
3942	Images with Impact!: Graphics and Symbols 1	59.
4583	Images with Impact!: Business 1	69.
	Think Educational ... CP	
3615	MacEdge II 1.0	27.
3616	Mind Over Mac 1.4	27.
	T/Maker ... NCP	
3640	ClickArt Personal Graphics	28.
3642	ClickArt Publications	28.
3632	ClickArt Business Images	28.
3636	ClickArt Holidays	28.
3637	ClickArt Letters Vol. 1	28.
3638	ClickArt Letters Vol. 2	28.



CE Software ... NCP

MockPackage Plus Utilities 4.4—A professional desk accessory set designed for increased productivity. Plus six outstanding utilities, including Aask (an INIT manager)..... $27.

920U

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We'll get it there

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3633	Christian Images	35.
3635	EPS Illustrations	75.
3639	WriteNow 2.0	109.
	TML Systems ... NCP	
3548	Source Code Library II 1.0	42.
3549	TML Pascal II 3.0 *(W/MPW 3.0)*	75.
	TOPS ... NCP	
4189	TOPS Teleconnector *(DB-9)*	39.
4188	TOPS Teleconnector *(DIN-8)*	39.
3726	TOPS for DOS 2.0	119.
3724	NetPrint 2.0	119.
3723	TOPS Mac 2.1	149.
4598	TOPS FlashBox *(90 days)*	125.
3725	TOPS Repeater *(90 days)*	132.
3720	TOPS Flashcard *(90 days)*	169.
3417	InBox Starter Kit 2.2	199.
3418	InBox Connection Mac 2.2	75.
	Traveling Software ... NCP	
3729	LAP-LINK Mac 2.0	84.
	True BASIC, Inc. ... NCP	
	LANGUAGE & TOOLKITS	
3587	True BASIC 2.01	59.
3570	Advanced String	49.
3574	Business Graphics	49.
3579	Mathematicians Toolkit 1.0	49.
3583	Scientific Graphics	49.
3584	Sorting & Searching	49.
3588	3D Graphics 1.2	49.
4178	Communications 2.0	49.
	EDUCATIONAL SOFTWARE	
3571	Algebra 3.0	35.
3573	Arithmetic 1.2	35.
3575	Calculus 1.2	35.
3577	Discrete Math 1.2	35.
3580	Pre-Calculus	35.
3581	Probability 1.2	35.
3586	Trigonometry 1.2	35.
3585	TrueSTAT 3.0	49.
	Unicorn ... CP	
3751	Animal Kingdom	27.
3752	Decimal Dungeon	27.
3753	Fraction Action	27.
3755	Mac Robots	27.
3756	Math Wizard	27.
3754	Read-A-Rama	32.
	William & Macias ... NCP	
3779	DiskFinder 1.07	29.



Satori ... NCP

Components GL 1.0—Customize your accounting with this flexible system. Build special journals and reports. Fast and intuitive. Includes presentation quality forms capability ..... $389.

3783	myDiskLabeler w/Color 2.8.1I	$31.
3784	myDiskLabeler w/LaserWriter 2.8.1LI	34.
	WordPerfect ... NCP	
3800	WordPerfect Mac 1.0.1	185.
	Working Software ... NCP	
3790	Lookup 1.0C	29.
3788	Findswell 2.0	36.
3792	Spellswell 2.0G	45.
3789	Spellswell Legal Dictionary 1.0	60.
3791	Spellswell Medical Dictionary 1.0	60.
4693	Quick Letter 1.0	75.
	Zedcor ... NCP	
3986	DeskPaint 2.0	69.
3985	ZBasic 5.0	99.

ENTERTAINMENT

	Addison-Wesley ... NCP	
4407	The Hobbit	24.
4474	Fellowship of the Ring	24.
	Accolade ... CP	
1184	Hardball	23.
4484	Mean 18	24.
4485	4th & Inches	24.



Silicon Beach Software ... NCP

SuperPaint 2.0—Award-winning graphics software for the Mac combines painting and drawing capabilities in a single program with a simple, elegant interface ..... $129.

	Access Software ... NCP	
4655	World Class Leader Board Golf	28.
	Blue Chip ... CP	
1441	Millionaire	35.
	Broderbund Software ... CP	
4099	Shufflepuck Cafe *(air hockey)*	24.
4111	Moebius *(adventure & arcade)*	24.
4229	Where in World Carmen San Diego?	27.
1421	Ancient Art of War	27.
4540	Ancient Art of War at Sea	27.
	Bullseye ... CP	
1544	Ferrari Grand Prix	32.
4074	P51 Mustang Flight Simulator	32.
	Casady & Greene ... CP	
2268	Crystal Quest 2.2C	26.
4119	Crystal Quest w/Critter Editor *(NCP)*	42.
	Discovery Software ... NCP	
4408	Arkanoid	27.
	Electronic Arts ... CP	
1851	Scrabble	26.
1850	Reach for the Stars	26.
1842	Chessmaster 2000	28.
4064	Chuck Yeager Flight Simulator	32.
4588	Life & Death *(surgery simulation)*	32.



Abacus Concepts ... NCP

StatView II 1.03—Award-winning statistical analysis program, now with presentation quality color graphics. The only statistics package to receive a "Five Mouse Rating" from MacUser! ..... $349.

	Epyx ... NCP	
2037	Sub Battle Simulator	29.
4660	Sub Battle Simulator for Mac II	29.
	Infinity Software ... CP	
2518	GO	27.
2519	Grand Slam Tennis	27.
	MEDIAGENIC ... CP	
4590	Corruption	27.
4486	Manhole	30.
4475	Quarterstaff	30.
4679	Universal Military Simulator	30.
4490	Might and Magic	36.
4592	Zork Zero	36.
	MicroProse ... CP	
4697	Pirates!	32.
	Microsoft ... CP	
2868	Flight Simulator	33.
	Micro Sports ... NCP	
2787	MSFL Pro League Football	32.
	Miles Computing ... CP	
2764	Down Hill Racer	24.
2767	Harrier Strike Mission II 1.2	32.
2765	Fool's Errand 1.1	32.
2763	Fool's Errand Hint booklet	7.
	Mindscape ... CP	
4083	Balance of Power 1990	30.
3987	Colony	30.
2743	Crossword Magic	30.
2745	Deja Vu	30.
4596	Deja Vu II	30.
2749	Shadowgate	30.
2750	Trust & Betrayal: Legacy of Siboot	30.
2751	Uninvited	30.
	PBI Software ... CP	
3110	Strategic Conquest Plus 1.3	35.
	PCAI ... CP	
4321	Lunar Rescue	34.
4517	Road Racer	39.
4212	MacCourses	29.
3144	MacGolf 2.0	35.
4320	MacGolf Classic	54.
	Primera Software ... NCP	
3169	Smash Hit Racquetball II	22.
	Sierra On-Line ... CP	
4161	Mother Goose	19.
3397	Leisure Suit Larry	23.
3394	King's Quest I	29.
3395	King's Quest II	29.



"The package beat me home!"

Dear MacConnection,

I am writing to tell you that an item which I ordered beat me home. I was visiting my brother and his family who live about two hours from my home. While I was there, I decided to order an item for my Mac. Well, I ordered it before 8:00 PM and before I could drive home the next morning, the package arrived.

To top it off, I live in a small Kentucky town, about an hour's drive from the nearest airport. What service! I don't know how you do it. Keep up the good work.

Sallie Evans

Sallie Evans
North Middletown, KY

1-800/622-5472

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Just for the record, all the ads in this series feature real live MacConnection customers and the real live letters they wrote us. Really!

Overnight. $3.

4002	19″ Monitor for Mac Plus	$1349.
4003	19″ Monitor for Mac SE	1349.
4004	19″ Monitor for Mac II	1449.
	Nuvotech ... 1 year	
3001	TurboNet ST *(DB-9)*	30.
3000	TurboNet ST *(DIN-8)*	30.
	Orange Micro ... 1 year	
4488	Grappler Spooler	39.
3036	Grappler C/Mac/GS	79.
4487	Grappler LS	92.
4076	Grappler LQ	103.
	PCPC ... 2 years	
3177	HD-WSI *(Apple HD-20 to SCSI)*	269.
3181	MacBottom HD 21 SCSI	659.
3180	MacBottom HD 21 w/Modem	759.
3185	MacBottom HD 32 SCSI	699.
3184	MacBottom HD 32 w/Modem	829.
3189	MacBottom HD 45 SCSI	859.
3188	MacBottom HD 45 w/Modem	979.
3190	MacBottom HD 70 SCSI	999.
4658	MacBottom HD 84 SCSI	1249.
3176	MacBottom IHD 144 Meg *(1 yr)*	1495.
	Practical Peripherals ... 5 years	
3100	1200 Baud External Modem	79.
3102	2400 Baud External Modem	181.
3089	Mac Communications Pack	229.
	Sharp ... 90 days	
3453	JX-450 Color Scanner *(includes IEEE card and cable)*	5895.
	Shiva ... 1 year	
4347	NetBridge	279.
3444	NetSerial X232	289.
3443	NetModem V2400	479.
	Summagraphics ... 90 days	
4298	BitPad Plus ADB	329.
	Thunderware ... 90 days	
3648	ThunderScan 5.0 with PowerPort	189.
3646	MacPlus/SE Power Accessory	29.
3645	Mac II Power Accessory	42.

DISKS

2214	**Fuji** 3½″ DS/DD Disks	19.
3297	**Sony** 3½″ DS/DD Disks	19.
3772	**Verbatim** 3½″ DS/DD Disks	19.
2792	**MAXELL** 3½″ DS/DD Disks	19.



Dove Computer ... 90 days

The Marathon Family of workstation products are designed to expand productivity and system flexibility. Included are accelerator boards for the Mac II and SE, combination EtherNet adaptors, and serial/parallel boards. Call to learn more.

INFORMATION SERVICES

	CompuServe	
1676	CompuServe Information Service	$24.
1671	Grolier's Online Encyclopedia	32.
1673	CompuServe Navigator 2.02	45.
1674	Standard Service/Navigator Bundle	59.
	Dow Jones	
1789	Dow Jones Membership Kit	24.
1785	Desktop Express 1.03	95.
1786	Market Manager Plus 2.0	189.

ACCESSORIES

	Bantam Books	
1403	Complete HyperCard Handbook	23.
	Computer Coverup	
1723	ImageWriter II Cover	8.
1722	ImageWriter LQ Cover	8.
1720	Mac Plus Cover Set	10.
1725	Mac SE Ext. Keyboard Cover Set	10.
4657	LaserWriter II Cover	10.
	Goldstein & Blair	
2267	The Macintosh Bible *(2nd Edition)*	21.



Nutmeg Systems ... 90 days

15″ Monitor—A superb full page display designed to be the ultimate in rock-solid image clarity and ergonomic design for professional use. For Mac II or SE, please specify ..... $999.

	I/O Design ... lifetime	
2378	MacLuggage HDware	49.
2379	MacLuggage Imageware II	49.
2376	MacLuggage Macinware Plus	64.
2381	MacLuggage Macinware SE	75.
	MacConnection	
4623	Solid Oak Disk Case, made by New England craftsman *(holds 90 disks)*	29.
	Moustrak	
2694	Moustrak Pad *(standard 7″x9″)*	8.
2692	Moustrak Pad *(large 9″x11″)*	9.
2693	Moustrak Pad L/F *(9″x11″)*	10.
	Moustrak Designer Series *(Features selected photos from the book, "A Day in the Life of America.")*	
4077	Window Washer 1	12.
4006	Thunderstorm 2	12.
4007	Old Cajun 3	12.
4008	Vietnam Memorial 4	12.
4009	Dance Class 5	12.
4010	Tea Lesson 6	12.
	Ribbons	
3255	ImageWriter II Ribbon	4.
3261	ImageWriter II 4-color Ribbon	9.



Practical Peripherals ... 5 years

Mac Communications Pack—Includes external 2400SA Modem, cable, and top-selling communication software. Hayes compatible, auto-answer. A superior value! ..... $229.

3270	ImageWriter II Rainbow Six Pack	20.
3260	ImageWriter LQ Black Ribbon	17.
4011	ImageWriter LQ 4-color Ribbon	20.
	Sopris Softworks ... lifetime	
4017	ImageWriter II Cover	11.
4019	Mac SE & Ext. Keyboard Cover	15.
4012	High Trek ImageWriter II carry case	49.
4013	High Trek Mac Plus carry case	59.
4014	High Trek Mac SE & ext. kybd. case	69.
	Targus	
3618	ImageWriter II Carry Case	49.
3617	Mac Plus/SE Carry Case	59.
4015	Mac SE & Ext. Kybd. Carry Case	69.

OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail, charged by weight.
- Upon receipt and approval, personal and company checks now clear the same day for immediate shipment of your order.
- COD max. $1000. Cash or certified check.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices subject to change without notice.
- To order, call us anytime Monday through Friday 9:00 to 9:00 EST, or Saturday 9:00 to 5:30 EST. You can call our business offices at 603/446-7711 Monday through Friday 9:00 to 5:30 EST.

SHIPPING

Continental US: Barring massive computer failures and other natural or unnatural catastrophes, all non-C.O.D. orders phoned into MacConnection by 8 PM EST will ship Airborne the same night for next day delivery, except for those within UPS Ground Zone 1 (which is also an overnight service). The total freight charge on any order placed with MacConnection is now $3. Backorders will also ship Airborne overnight at no additional charge. Some areas require an additional day delivery.

Hawaii, Alaska and Outside Continental US: Call 603/446-7711 for information.

from 'most anywhere.

3396	King's Quest III	$29.
3399	Space Quest	29.
3400	Space Quest II	29.
3398	Police Quest	29.
	Silicon Beach Software ... NCP	
3500	Airborne! *(CP)*	20.
3505	Enchanted Scepters *(CP)*	21.
3503	Dark Castle 1.1	27.
3502	Beyond Dark Castle	27.
3501	Apache Strike 1.1 *(MacSE & II)*	27.
	Simon & Schuster ... CP	
3303	Star Trek—Kobayashi Alternative	24.
3304	Star Trek—Promethian Prophecy	24.
	Sir-Tech ... CP	
3347	Mac Wizardry	35.
	Softstream, Inc. ... NCP	
4071	Mac•Man *(w/adapter)*	24.
4072	The Solitaire DA	24.
4073	Colour Billiards	35.
4078	Game Pak *(above 3 titles)*	75.
	SPHERE, Inc. ... NCP	
4175	Solitaire Royale 1.1 *(for Mac SE)*	20.
4001	Solitaire Royale *(for Mac II)*	20.
3464	Tetris 1.1	20.
4472	Tetris *(for Mac II)*	24.
3462	PT-109	26.
3460	GATO 1.42	26.
3461	Orbitor 1.1	26.
3459	Falcon 2.0	32.
	Spinnaker/Hayden ... CP	
2328	Sargon IV	29.
	SubLogic ... CP	
4698	Jet 1.0	32.
	XOR ... NCP	
3816	Pro Challenge	29.
3815	NFL Challenge	59.

HARDWARE

Manufacturer's standard limited warranty period is listed after each company name. Some products in their line may have other warranty periods.

	1 Meg SIMMs	call
	Abaton ... 5 years	
1188	ProPoint ADB	89.



Farallon ... NCP

ScreenRecorder 1.0—Lets you create a continuous "tape" of any activity on your screen. Tapes can be combined with HyperCard and MacRecorder to create multimedia presentations ..... $135.

4589	InterFax Modem	$329.
	Asher Engineering ... lifetime	
1212	Turbo Trackball ADB	69.
1211	Quadlynx Trackball *(non ADB)*	69.
	AST Research ... 6 months	
4666	Mac 86	call
1229	Mac 286	call
	Cutting Edge ... 1 year	
3988	CE 105ADB Keyboard w/QuicKeys	149.
3989	800k Disk Drive *(platinum)*	175.
3990	The Wedge XL 30+ SCSI Drive	579.
3991	The Wedge XL 45+ SCSI Drive	729.
	Datadesk ... 2 years	
1819	MAC-101 Keyboard *(beige)*	145.
1820	MAC-101 Keyboard *(platinum)*	145.
1821	MAC-101 Keyboard *(ADB)*	145.
	Dove Computer ... 90 days	
	FastNet networking products	call
1801	SCSI Interface/Port	109.
1807	MacSnap 524E	289.
1809	MacSnap 524S	379.
1811	MacSnap 548 *special*	499.
1812	MacSnap 548S	599.
1800	MacSnap 2SE	439.



Thunderware ... 90 days

ThunderScan 5.0 with Power Port—Turns an ImageWriter into a high-resolution image scanner. Images look better than ever with new version 5.0 software. Now with gray scale display and editing on the Mac II. ..... $189.

1797	MacSnap Plus 2	439.
	ACCELERATOR BOARDS	
1793	MaraThon 020 MSE1	585.
1794	MaraThon 020 MSE2 *(1 Meg)*	979.
1795	MaraThon 020 MSE3 *(math chip)*	779.
1796	MaraThon 020 MSE4 *(1 Meg/chip)*	1159.
4231	MaraThon 020 MSE4x4	2195.
1803	1024 Option	439.
4663	Marathon 030 Accelerator 32 Mhz	1039.
	Ergotron ... 1 year	
2004	Mouse Cleaner 360°	15.
3992	The Muzzle *(covers power outlet)*	62.
1998	MacTilt *(platinum)*	68.
2000	MacTilt SE	68.
1999	MacTilt Large	85.
	Farallon Computing ... 1 year	
2202	PhoneNET-AppleTalk 120	9.
2203	PhoneNET PLUS *(DIN-8)*	35.
2204	PhoneNET PLUS *(DB-9)*	35.
2205	PhoneNET Punch Down Block	69.
2201	TrafficWatch 1.08	145.
2206	PhoneNET StarController	1199.
	FWB Software ... 1 year	
4263	PocketHammer40	999.



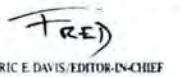
Olduvai Software ... NCP

Read-It! O.C.R. 2.0—Fully trainable O.C.R. for use with any scanner. Creates text files from books, newspapers, price lists, etc. New super-fast version 2.0 includes "EasyLearn". . . $199.

4264	PocketHammer80	$1499.
3999	Hammer155	2899.
4000	Hammer300	3999.
	Hayes ... 2 years	
2300	Smartcom II 3.0B	88.
2304	Smartmodem 1200	299.
2307	Smartmodem 2400	449.
	Kensington ... 1 year	
2563	Mouse Pocket ADB	8.
2577	Mouseway *(mouse pad)*	8.
2569	Mac Plus or SE Cover	9.
4126	LaserWriter II Cover	17.
2589	Universal Printer Stand	15.
2562	Mouse Cleaning Kit w/Pocket	17.
2545	Universal Copy Stand	22.
2573	Maccessories Tilt/Swivel	22.
4643	Mac II Stand and Cable Kit	65.
2556	Maccessories Anti-Glare Filter	33.
2559	Apple Security System	34.
2568	Maccessories SuperBase	34.
2585	Printer Muffler 80	43.
2586	Printer Muffler 80 Stand	24.
2583	Printer Muffler 132	58.
2584	Printer Muffler 132 Stand	24.
4070	System Saver SE	52.
2566	System Saver Mac *(platinum)*	64.
2546	Maccessories A-B Box	64.
2560	MasterPiece 400	64.
2561	MasterPiece Mac II	105.
2547	New Turbo Mouse ADB	109.
2576	New Turbo Mouse for Mac Plus	109.
	Koala Technologies ... 90 days	
2593	MacVision 2.0	219.
	Kraft Systems ... 5 years	
2600	3-Button QuickStick	39.
4082	3-Button QuickStick ADB	51.
	Kurta ... lifetime	
2604	IS ADB Tablet	255.
2605	Cordless 4 Button Cursor *(1 year)*	65.
	Mobius Technologies ... 1 year	
4470	Fanny Mac QT	65.
	MSC Technologies ... lifetime	
2808	A+ Mouse	65.
2809	A+ Mouse ADB	85.
	Nutmeg Systems ... 90 days	
2992	15" Monitor for Mac Plus	call
2994	15" Monitor for Mac SE *special*	999.
2993	15" Monitor for Mac II *special*	999.

Letters

Just when we thought the debate about the columnists' pictures — woodcut versus photo — had finally subsided, an anonymous reader in Los Angeles added this fuel to the fire. "Although he may not be a sex symbol, the editor-in-chief does have a nice FRED signature." If you're really



FREDERIC E. DAVIS/EDITOR-IN-CHIEF

into signatures, pry open your Mac Plus and feast your eyes on the inside of the case. When you've recovered, send your comments to Letters to the Editor, c/o MacUser, *950 Tower Lane, 18th floor, Foster City, CA 94404. All letters become the property of* MacUser, *and we reserve the right to edit any letters we print.*

BUT WHAT DID REMINGTON STEAL?

Your use of Miss Remington's picture in the opening artwork for Jane Berliss' article "Tip for Type" (November '88) reminds us all once again that the keyboard found on 99.9 percent of all computers dates back to 1873. However, a few clarifications are in order.

The QWERTY keyboard layout was *not* designed to slow typists down. The first typewriter, invented by C.L. Sholes, used type bars that hung upside down in a circle, swinging up to the paper for printing (which meant you had to lift the carriage to see what you were doing!). Type bars close to each other in this circle tended to clash when struck in succession. So Sholes took a statistical look at English spelling and assorted his letters in the circle so that common letter pairs would swing up from opposite sides of the machine, reducing the frequency of clashes. The intention was to allow fast typists to clatter along with fewer jamups, thus increasing, not reducing, speed.

Once the Sholes keyboard appeared on the first commercial machines, other inventors tried to knock it down. The first notable attempt was by James Hammond, whose typewriter of 1884 had a keyboard arrayed in a radical two-row semicircle, with the most



common letters clustered just to the right of the space key, to favor right-handed users. Hammond thought the keyboard curve would be more comfortable for the two-fingered typing of the day. The Blickensderfer typewriter of 1893 offered what it called the Scientific keyboard, which used some of the same ideas that Dvorak used years later.

By the way, both the Blickensderfer and Hammond were single-element machines, pre-dating IBM's "revolutionary" golfball design by three-quarters of a century.

DARRYL REHR
LOS ANGELES, CALIF.

The writer is the editor of ETCetera, *the newsletter of the Early Typewriters Collectors Association. If you'd like more information or a copy of their Beginner's Guide To Collectable Typewriters, send an SASE to 11433 Rochester Ave. #303, Los Angeles, CA 90025. — JZ*

GUARANTEED SOLUTIONS

The practice of magazines and advertisers of including a Not Copy Protected (NCP) statement seems to have played a major role in causing most software producers to stop using copy protection schemes. I would like to suggest that the same approach be used towards "encouraging" producers to provide a money-back guarantee for products that fail to meet advertised performance.

I recently read a letter from the president of Solutions International (published in the Boston Computer Society's *Active Window*) stating that they have such a policy and they "have only been asked to return 11 people's money in one-and-a-half years and 15,000 buyers."

The letter further stated that people need not go through their dealers but can contact Solutions directly with proof of purchase. Responsible firms with quality products can only gain by openly proclaiming such a policy. I know where my money would go, given a choice.

BILL CHENAULT
SHALIMAR, FLA.

We like this idea and are discussing ways to include information about (unfortunately rare) product guarantees in future product reviews. — JF

UPTEMPO

Thanks for the excellent Quick Click on Tempo II in your December '88 issue. We're proud of our 4.5 mice here and perhaps this note will add a bit more mouse.

The reviewer bitterly lamented the cursor not returning to its origin after a macro play. If he had checked the box labeled "Return cursor after play," the one shown in the Configuration dialog box in your article, his wish would be our command. We've received some real fan mail from graphic designers for that single feature.

As for his other concern, the speed of typing text, Tempo II also includes

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Letters

Autopaste. Select any amount of text and turn it into an instant Autopaste macro. Instead of typing, the macro pastes into a document. It's instant.



Here's an example: While it takes Tempo II 7 seconds to type 100 characters into Microsoft Word, it takes 1.5 seconds to plan an Autopaste macro of 1,842 characters (this note) or more. Incidentally, Autopaste works with graphics as well.

RICK BARRON
PRESIDENT, AFFINITY MICROSYSTEMS

I hope that other Tempo II users have better luck than I did with the "Return cursor after play" box. For whatever reason, even with the box checked I could not always get the cursor to return. I do appreciate, though, that it's not happening to me because Tempo II's designers overlooked the problem. As for Autopaste, while it's a nice feature, it's completely separate from the regular macro-building process, which makes it useful only for pasting in simple boilerplate material. These are minor quibbles, though. Tempo is a fine utility that neither I nor my keyboard would part with. — JB

BLYTH SPIRITS

If *Car and Driver* magazine were to rank cars after the fashion in which you reviewed databases in your December '88 issue, their conclusions might sound something like this:

"The winner of this year's Car-of-the-Year award won't be decided until next year. Foxmobile currently has the lead simply because it's so fast. Never mind that it only seats one and lacks certain amenities, like a windshield, a radio, hubcaps, etc. It's constantly being enhanced, so we can expect to see some of these features next year. You can live without them for now.

Honorable mention goes to 4Dmobile (another newcomer), because it's so comfortable. It compares favorably to a Cadillac in all areas but one — it has a top speed of only 5 miles per hour. But that's OK; next year's model will go somewhere between 25 and 200 mph. Trust me!

The Helixmobile comes in third for being so . . . well . . . different! It also has speed problems, and lacks amenities to boot — there's no way, for example, to shift gears. But it's running comfortably in its own lane — the slow lane."

Now, would *you* buy a used car from this magazine?

Incidentally, specifying fonts for a report to be printed to a LaserWriter is no more difficult to set up in Omnis 3 plus than it is in Microsoft Word. And you accidentally forgot to mention the fact that Omnis 3.3, our current release version, can share data directly with Omnis Quartz on the IBM PC in the Windows environment. Simultaneous multiuser database access between Macs and PCs might have been of passing interest to some of your readers.

STEVENS WELLER III
SR. TECHNICAL SUPPORT EXECUTIVE,
BLYTH SOFTWARE
FOSTER CITY, CALIF.

The general review of databases in your December '88 issue was most informative. But one general conclusion of the review is puzzling: Despite its generally excellent combination of features and speed, Omnis 3 plus is not listed as a worthwhile general choice for a small- to moderate-sized business.

I have been using a program written with this database for medical office billing for two years and it seems to perform rapidly and efficiently in a very complex configuration.

An omitted feature of interest in comparing relational databases, in addition to their speed, is the *size of the files* they create. This parameter seems to vary greatly. Some of these databases are true space hogs, while others use hard-disk space efficiently.

DR. A.M. FELDZAMEN
SAN DIEGO, CALIF.

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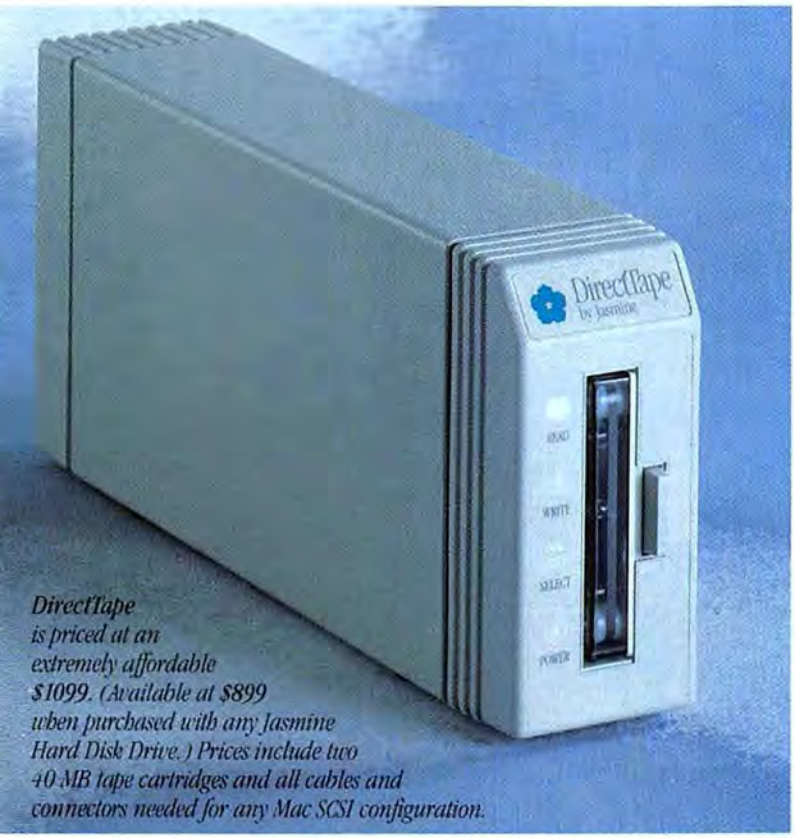
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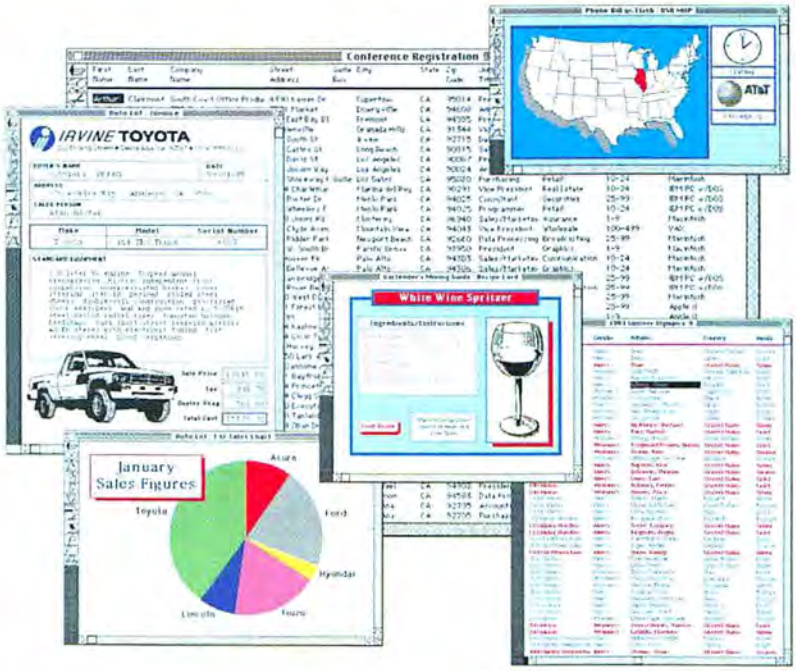
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Letters

JUST WHAT THE DOCTOR ORDERED

Some in the Macintosh community may feel uncomfortable when you publish detailed autopsies of viruses. For the victims, however, that information gives the power of detection and repair.

The Macintosh I use at work began to balk unexplainably. Word quit or wouldn't print. Since this was shortly after the System 6.0 upgrade (with known bugs), we assumed System trouble.

However, settling down one night to read my Macintosh magazines, I read your article "Razor Blades in Apples" (September '88).

Ah.

Oh.

Ooooo.

Bad news. I wrote a note in the margin, next to the Scores virus symptoms: "Machine has a bad Scrapbook."

The next day, we discovered that nearly all of the machines in our Graphics and Editing department had bad Scrapbooks and notebooks. Since these machines were semi-open machines used by other people in the building, we had no way of knowing how the virus arrived or where it had gone. Fortunately, since I only trade data and not programs, my machine at home remains uninfected.

We obtained Virus Rx and Interferon and cleaned our hard disks. We referred to the article and referred others to the article. "It is a problem, but not a disaster." It went a long way towards controlling potential panic.

Sadly, since many of the reinitializations were done with the master disks, some of our master disks were infected. We now know to lock our disks before inserting them into a Mac.

Our discovery and recovery began with your well-timed article. Thank you again.

LOWELL HALVORSON
SALEM, MASS.

THE OUTER LIMITS

Do you think you could place Dvorak's column any further back in the magazine?

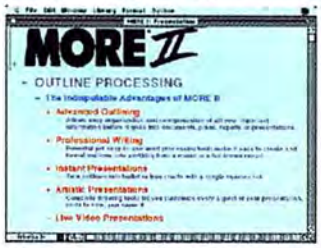
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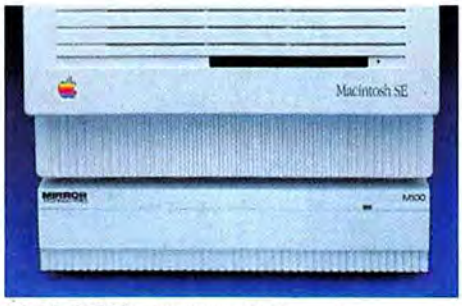
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EDITED BY RUSSELL ITO

Suits and Excitement in London



Over 13,000 business-oriented Macintosh enthusiasts attended the recent three-day *MacUser UK* Show in London. In a country where the state-of-Mac-art is nearly a year behind that in the United States, virtually all the attendees (both male and female) wore conservative business suits, and the charged atmosphere was reminiscent of the first few Macworld expos. There was an electricity and excitement in the air often lost in the sheer hugeness of American shows these days.

More than 100 exhibits were divided very roughly into three categories: U.S. software products (usually represented by local distributors), British software and hardware companies, and local service and user group organizations. Among the readily recognizable products (to Americans) were Wingz, StandOut!, 4th Dimension, CAT 2.0, Claris CAD, Omnis 3 Plus, MicroPlanner Plus, QuarkXPress 2.0, Timbuktu, Word, Persuasion, and, of course, Crystal Quest (which was written in England). Omnis and MicroPlanner were shown by their original British developers, while 4th Dimension was shown by its original French developers.

Wingz made a big splash — Informix brought a version of its famous Space Shuttle booth to London. Informix is trying to take advantage of Excel's perceived overall weakness in Europe to get a firm foothold for its power whatever-they-call-it-now package (Microsoft's reputation and strength in Europe is nowhere near what it is in the US).

Among the new product introductions were two high-performance gray-scale image grabbers from Neotech (one for the SE — approximate U.S. cost $1,600; and one for the Mac II — approximate U.S. cost $2,300); the nice 20-inch Pictor I color monitor from ETAP (with a 1,024-x-768-pixel display); and the Honeywell TT200 color thermal printer, which will be sold in the United States by Matrix Instruments for $5,590.

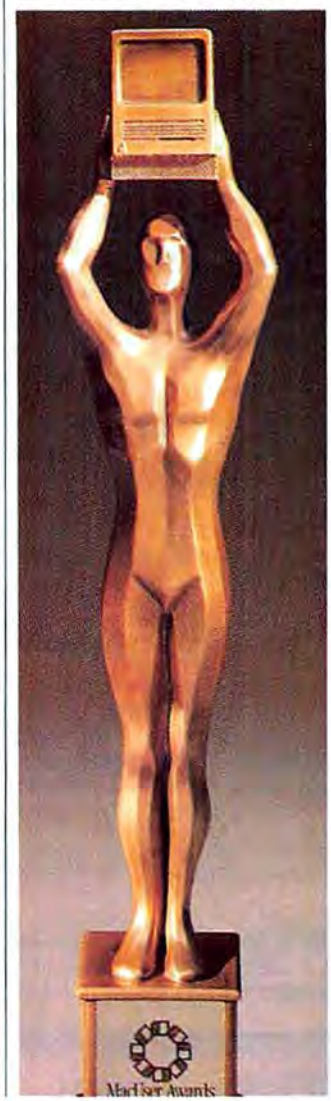
BBC's Interactive Television Group demoed the best multimedia project I've seen. It's called The EcoDisc and it lets you tour and explore an English nature preserve. You can view the area in summer and winter, investigate whatever interests you in the region, make policy changes, and project the future of the area. It's altogether fascinating. This project uses a 12-inch videodisc for color imagery and high-quality sound and a HyperCard stack for user interaction. It was simply stunning and constantly drew crowds to the Apple. It generates real hope for the future of multimedia.

This year's show was held in London's Business Design Centre in North London. The BDC was originally built as the Royal Agricultural Hall and was used for livestock displays. It's a spectacular example of 19th-century English ironwork, and the most pleasant Mac exhibition hall I've ever been in. Though its location is somewhat out of the way, it was overrun by crowds each day and the organizers announced that next year's show would be held at the much larger (at least twice as big) Olympia Hall.

The dates, if you want to start planning now, are November 1 through 4, 1989.

— *Steven Bobker*

Announcing the 1988 Edwards



At a ceremony held in the posh and prestigious Barbican Centre in central London, the United Kingdom version of *MacUser* presented its annual awards for the best products of 1988. Like those of its U.S. cousins, these awards (and their accompanying statuettes) are called Eddies.

Felix Dennis, the original publisher of *MacUser UK,* opened the award ceremony. His introduction was followed by remarks from Phil Chauveau, the dynamic new managing director of Apple UK, who predicted a fivefold increase in Mac sales in the next year or two. And no one in the audience doubted him.

The Eddy for best business application went to Double Helix. FreeHand took the prize for best graphics software, and its stablemate PageMaker 3.0 took the Eddy for best publishing software. The award for best utility went to DiskTop, while Word was named the best word processor. The best connectivity product prize went to TOPS 2.0. The DataPak 45 removable hard-disk system took the best hardware peripheral award. The editors also selected 4th Dimension for an Eddy for the best European product.

A special award for outstanding contributions to the Macintosh community went to Bill Atkinson. Bill couldn't be there in person, but an audiotape of him accepting the award and talking

about his version of the Mac future was played to enthusiastic response. Finally, *MacUser UK*'s readers voted on what they thought were the best hardware and software products available. They picked PageMaker for the software prize and the locally made MiniQisk hard-disk drive took the hardware prize. The readers also forced the editors to award Apple two special awards, for the Macintosh II and the LaserWriter II. [*The recipients of* MacUser *USA's 1988 Eddie awards will be announced in our May '89 issue. — Ed.*]

— Steven Bobker



DynaPerspective's tool palette says it all, from basic lines and an all-purpose prism to walls, posts, stairs, and roofs.

A Better Perspective

Somewhere between 3-D art applications and dedicated CAD behemoths, there's DynaPerspective: a 3-D modeling and design application that's new to the Mac II, but a four-year veteran on PCs. Unlike some applications ported from DOS, this one feels right, partly because its interface was Mac-like from the start.

DynaPerspective features full color 3-D modeling, with a focus on architectural renderings. It has an icon interface for positioning the viewpoint, field of vision, and light source, with numerical options available for precise sizing and positioning. Object creation and editing is done in wire-frame mode. Most work can be done by mouse or numerical inputs, or by a mix of both. Up to four views, three orthogonal and one perspective, can be active.

The tool palette is chiefly dedicated to objects like stairs, roofs, and walls. You can also draw transparent solids, like glass panes or curtains, with variable degrees of transparency. Options for a standard grid snap or object snap help you draw adjacent solids in perfect alignment. Resizing is normally constrained so you don't unwittingly warp objects when altering them from an oblique viewpoint.

You can "fly" your viewpoint, or camera, in and around a model using a dedicated control panel. DynaPerspective simplifies the process by letting you specify a sequence's starting and ending points and the number of frames between them. The program then creates and outputs the frames as video (with special add-on boards) or Scrapbook pages. The camera's path also can be saved separately and used on any 3-D scene.

DynaPerspective can import 2-D graphics and extrude them into 3-D. It also has special management features to create and use parts libraries, both home-brewed and purchased. It can save any view in full color as a PICT2 document. DynaPerspective requires a Mac II with 2 megabytes of RAM and an 8-bit color or monochrome video card. A hard disk is recommended but not required. DynaPerspective ($1,495) is available from DYNAWARE, 1163 Chess Drive, Suite J, Foster City, CA 94404; (415) 349-5700.

— Salvatore Parascandolo

NEWS LINE!

EDITED BY GIL DAVIS

Faster Color Coming

CUPERTINO, CALIF. — A new color QuickDraw imaging and accelerator card from RasterOps speeds up color image processing by one to two orders of magnitude, boosting Mac II performance to speeds previously attainable only with expensive graphics workstations. The 8-bit $2,300 Color Board 118 was due to be in production by February and appears to be targeted at CAD applications. RasterOps claims that imaging operations are typically 15 times faster than with Apple's standard 8-bit Apple color card, while some functions, such as vector redrawing, show a 62-fold improvement in speed. In addition to the QuickDraw accelerator, RasterOps is also developing Display PostScript technology (currently only for Sun systems).

Three Lawsuits Hit Jasmine

SAN FRANCISCO, CALIF. — Management conflicts at Jasmine have resulted in three lawsuits being filed against the company. The first suit, for $2.5 million, came from Michael Mikel, a minority stockholder who alleged that Jasmine shipped products with high defect rates. A second suit came from Jasmine cofounders Mark James and Alan Brunner, who charged unwarranted dilution of their stock shares. A third lawsuit came from a suspended Jasmine employee, Marcia Mason, who is seeking $2.5 million for defamation, breach of contract, and fraud. Jasmine president Dennis Chang asserted that a preliminary investigation found that the suits were without merit and that they would not affect the company's day-to-day operations.

Ashton-Tate Sues to Protect dBASE

LOS ANGELES, CALIF. — Ashton-Tate has sued two competitors, Fox Software and Santa Cruz Operation, for allegedly violating copyrights of its dBASE products by duplicating their concept and visual appearance. Both defendants have denied the accusation and say they will continue to sell their FoxBASE products, which have been marketed since 1986.

Hard-Disk Prices Heading South

BOCA RATON, FLA. — A quantum jump in hard-disk technology announced by Rodime could drive prices for hard disks down substantially over the next few years. Rodime recently doubled the storage capacity of its 3.5-inch drives, taking them from just under 100 megabytes to 215 megabytes, resulting in a much lower per-megabyte cost. Rodime's 215-megabyte drive has an 18-millisecond average seek time and features an integral controller for both Macs and IBMs.

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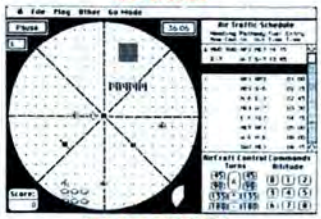
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NEWS LINE!

Speaking Out: How OS/2 Will Impact the Mac

The Mac could be in for some stiff competition from new applications running on IBM-compatible computers using Microsoft's Windows and Presentation Manager. To see if this pending battle will slow or halt the rapid growth of the Macintosh, we asked for comments from developers who work in both the Mac and Big Blue graphic environments:

"I think the Mac will continue to expand because of what's happening in programming, which creates applications. We used to have COBOL, Fortran, and other programming languages where the machine controlled the user. Now, primarily because of the Mac, we've all been led to programming graphically. Some people might think that the Mac will be hurt by programmers moving from the Mac to OS/2, but I think the number of graphic programmers will increase at an ever-rising rate. This will only enlarge the opportunity for the Mac."

— Mike Maples, Director of Applications, Microsoft Corporation

"Since the Macintosh now has a lot of leading applications for its graphic interface, you could say it has the lead. But in the long run, more and more applications will be coming out for OS/2 and the Presentation Manager throughout this year and into 1990. When people see these programs, they'll notice a lot less difference between the IBM environment and the Mac than they've seen in the past. We all hope that Apple will continue to develop innovations that will allow it to maintain its lead. But the gap has certainly narrowed."

— Edward M. Esber, Chairman and CEO, Ashton-Tate Corporation

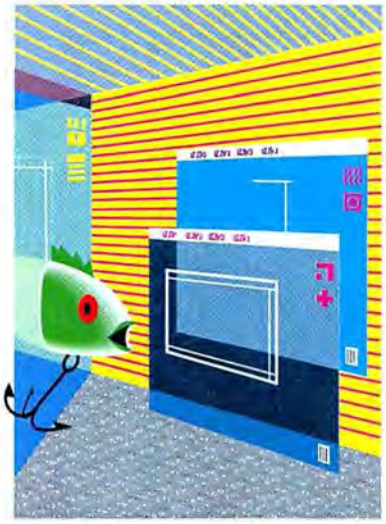
"I think the Mac could actually benefit from new OS/2 applications, which we project will be 40 to 60 percent of the microcomputer market in 1993, with about 30 percent DOS and 10 to 20 percent Mac. The Mac is a big enough market to shoot for, but developers could abandon it for the bigger markets. They don't have to if they use object-oriented languages, which can take graphical programs across different platforms. Using this capability, I'm bringing Harvard Graphics to the Mac because my corporate customers are demanding it."

— Fred M. Gibbons, President and CEO, Software Publishing Corporation

"The Mac IIx is a fantastic machine with great graphics and great screen resolution. It's more geared to DTP and engineering applications. OS/2 has a lot of strength in its LAN manager with the ability to have distributed processing that lets applications and data be spread around on various machines in an office setting. I see the Mac as having a good position and staying there and not being hurt tremendously by OS/2."

— Chuck Middleton, Manager of OS/2 Development, WordPerfect Corporation

THE
MACINTOSH ANALYST



Windows of Opportunity

Next month's Comdex could herald a major challenge to the Macintosh. A number of Mac look-alike programs will be introduced on IBM-compatible computers using two graphic environments: OS/2 Presentation Manager (PM) and Windows. (Windows was developed by Microsoft, and PM is a joint development of Microsoft and IBM.) These new applications will boast the kind of ease of use that has been the hallmark of the Macintosh and largely unavailable on IBM-compatible systems.

This long-awaited blooming of the Windows/PM world has led a number of market researchers and industry analysts to predict an end to rapid growth for Apple and its Macintosh. They argue that IBM's push for OS/2 and PM adds up to trouble for the Mac.

Are the days of fast growth and rising market share over for the Macintosh? Will the accelerating acceptance of Microsoft Windows and the OS/2's PM in corporations spell doom for the Mac? Will corporations lead the world back to Big Blue computing?

Not likely. I believe that the Macintosh is here to stay and that it will continue making inroads into corporate computing as well as into smaller businesses and homes.

Granted, the gap between what you can get on a Macintosh and what's available on IBM-compatible computers has narrowed, now that the best software for Windows and PM compares favorably with what's available for the Mac.

Granted, too, that the Windows/PM environment has diverted some Mac software developers to the Intel world of IBM and compatible systems. As a matter of fact, some of the PC's best programs are ports of Macintosh products, as shown by Aldus' PageMaker and, to a certain extent, Microsoft Excel.

Granted, further, that corporate heads are turned by IBM's way of computing, and IBM is bombarding corporate customers with its vision of centralized control of computing resources. What's more, information-systems professionals from the mainframe world are very responsive to the idea that they can regain control of personal computers with OS/2.

However, even granting all that, the facts simply do not add up to any real loss of momentum for the Macintosh. On the contrary, there's a good chance that Apple's gains in the corporate world will continue, and it's a virtual certainty that the Mac will easily hold the corporate territory it has already gained.

The first reason for this is that, Apple's look-and-feel lawsuit notwithstanding, in reality Windows and the OS/2 Presentation Manager — while a big improvement over the DOS C> command prompt — still fall far short of the Macintosh in ease of learning and ease of use. Even with the relatively more Mac-like features of New Wave or of the OS/2 shell interface, Windows and PM retain elements of their history that still leave them less intuitive and less user-friendly than the Macintosh.

Second, while the best of Windows/PM software may match what is available on the Mac, the variety and depth of software falls far short of what the Macintosh has to offer. It will be a long time before the Windows/PM software selection really matches that of the Mac.

Third, despite the burning desire of some computer managers to "take control" of personal computers in their organizations, that is likely to happen in only a small number of rigidly hierarchical companies. Most corporations will be more concerned with serving computer users than with controlling them.

Fourth, senior executives aren't too comfortable with using computers in the first place. For them, the Mac offers a much easier and quicker way to become productive than anything IBM and compatible systems have to offer, even with OS/2 and PM.

The facts simply do not add up to any real loss of momentum for the Mac.

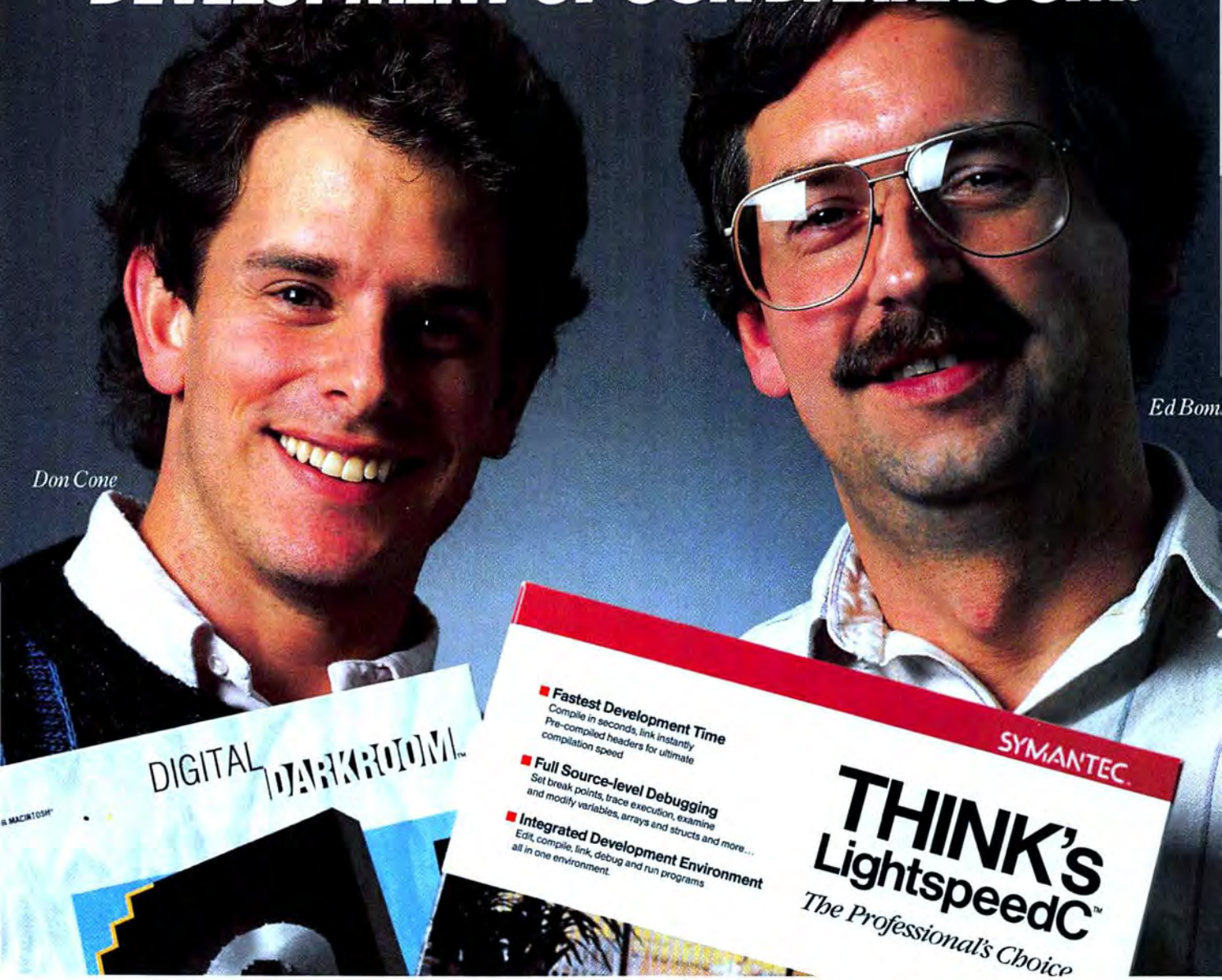
Fifth, the growing use of local-area networks and the development of increasingly powerful network software work strongly in the Mac's favor. Despite hysterical claims to the contrary by mainframe bigots, the emerging networked world of distributed resources is making it easier for different computers to coexist and to heighten the productivity of work environments. Apple's joint activities with vendors like DEC are an important step here.

And, finally, the Macintosh continues to step out ahead with innovative software. HyperCard is an excellent example of this. It provides extensive capabilities that are no more than a theoretical possibility in the world of IBM-compatible systems. So let the doomsayers rant on. The IBM world will still be playing catch-up well into the 1990s.



BY WILLIAM ZACHMANN

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Big Frame Hunters

You don't need to scour the savannas of Kenya — or even to cruise the byways of Broadway — to capture a wild animal. Armed with either the ComputerEyes video digitizer from Digital Vision or MacVision from Koala Technologies and any National Television Standards Committee (NTSC) video source (VCR, camera, or videodisc), you can capture your prey for less than the cost of a safari.

With the ComputerEyes serial, 8-bit gray-scale digitizer, images can be scanned at a resolution of 320-x-200 pixels in 6 seconds, or at 640-x-480 pixels in 24 seconds. On the Mac II, images can be displayed in 256 grays, high contrast, dithered grays, or halftones. You can preserve your beast in TIFF, raster image file format (RIFF), Encapsulated PostScript Format (EPSF), and MacPaint and PICT formats. The software image editor lets you shrink, expand, mirror, or invert his pelt to suit your taste.

If you're tracking an Australian arboreal marsupial, you'll be glad to know that version 2.0 of Koala's MacVision serial digitizer is out of the trees. MacVision 2.0 captures NTSC video and produces a 640-x-480-pixel image in 256 grays that can be saved in RIFF, TIFF, EPSF, as well as PICT, PICT2, and MacPaint formats.

The Quick View option lets you preview the composition, lighting, and contrast of the image to be scanned, and lets you save it in 4-, 6-, or 8-bit gray-scale format for either a Mac or PC. MacVision offers ten different dither patterns for display on the Plus and SE, as well as a range of image-enhancement features, including brightness and contrast controls.

ComputerEyes works with the Mac 512KE on up and is available for $249.95 from Digital Vision, 66 Eastern Ave., Dedham, MA 02026; (617) 329-5400.

You can snare MacVision 2.0 for the Mac Plus on up for $399 from Koala Technologies, 269 Mount Hermon Road, Scotts Valley, CA 95066-4029; (408) 438-0946.

— Michael Miley



Koala's MacVision 2.0 is cheaper than a safari, but you can still capture your prey — albeit in 8-bit gray scale.

PETER A. GOULD

RUMOR MANAGER

The recent spate of Mac-specific magazines that you've noticed is not about to stop. Indeed, even as we write this, the debut issues of several more magazines are being prepared. Part of the reason (or blame) is simply the very large number of Macs now in use. That number is not the Rumor Manager's concern except for its actual size — a closely (sort of) Apple-guarded secret. (By the way, we hear the 1989 shipment projections are 875,000 SEs, 475,000 IIs and IIx's, 65,000 laptops, and 50,000 it-doesn't-have-a-name-yet.)

Back to the new magazines. Recent months have seen a new weekly (at least they claim to be weekly), new monthlies, and new electronic publications. Expect to see soon (at the very least): one more pretty slick monthly (edited by a name that should be very familiar to the readers of another Mac monthly — not *MacUser*, we hasten to add). There'll also be a spate of nice-looking, well-written, and — so their publishers hope — extensively read newsletters. The desktop presentation, legal, medical, and desktop publishing newsletters already in publication will be joined by publications devoted to computer-aided design and manufacturing (CAD/CAM), DEC connectivity, IBM connectivity, LAN, electronic and voice mail, office systems, and music.

We've even heard of a cheap (less than $50 per year) entertainment newsletter, but we don't think that'll fly unless it sticks strictly to flight-simulator software (there's even more coming soon) and targets Mac-using pilots. Possible title: *Fly by Mac.*

Researchers on both the East and West coasts who are developing one of the new branches of artificial intelligence (AI) are doing all their work on Mac IIx's, both in stand-alone and networked configurations. Most of the work is being done under A/UX, and Apple is keeping the group supplied with versions more current than those the rest of the A/UX community sees. (We were about to say "than the general public sees," but "general public" has little meaning with regard to A/UX. Maybe next year. Or the year after that.)

The developers still don't feel that they can provide the necessary interface niceties within the A/UX framework, as versatile as it's become. So they've turned to HyperCard. We hear that several features of HyperCard 2.0 will be specifically aimed at facilitating this AI interface.

Speaking of HyperCard, the general release of version 2.0 is still a way off, and it seems unlikely that you'll see it before 1990. By that time, you might well see Europe's answer to HyperCard. No, it's not the excellent Guide reshaped and reformed, but an entirely new product being developed in the London area.

So far, the basic program is more of a personal information manager than HyperCard is, and its interface, while quite flexible and customizable, is more rigid than HyperCard's. Modeled — very roughly, we grant you — after the famed Filofax organizers, it uses leaves (which come in pads), help points, meeting points, and check points. The version we saw had used particularly British terminology, which might not survive into the final product.

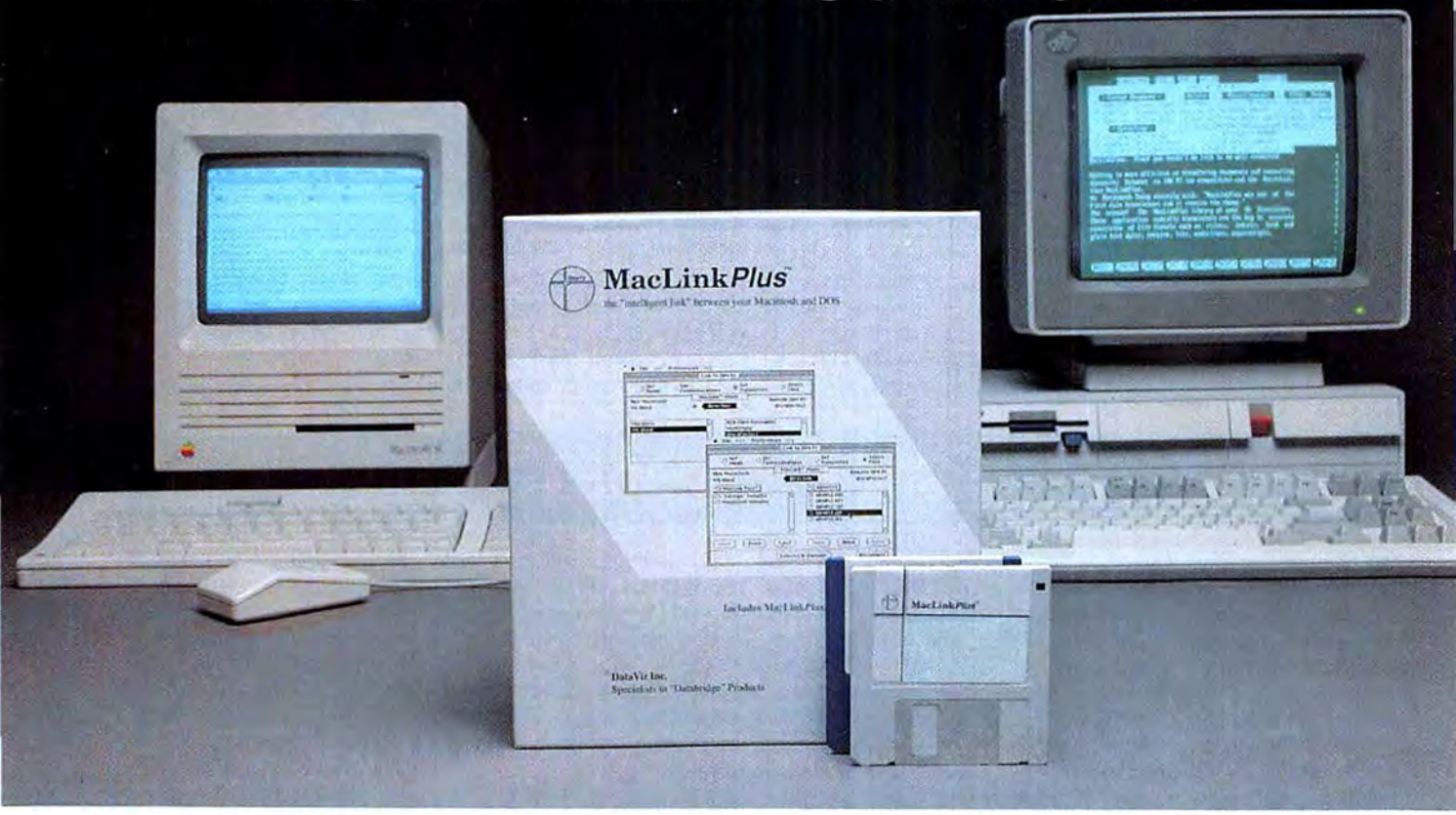
The *groupware* buzzword mania shows every sign of becoming a true plague. That's especially true since the more astute PR people (yes, you know who you are) have realized that virtually every program can be called groupware. The few that can claim the power word of early 1989 will generally be able to do so after minor modifications.

Have you heard any good rumors recently? Started any yourself that you'd like to take credit for? Can you share your "knowledge" with us? Does your legal department agree? Will you share anyway?

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Suitcases Two by II

It seems good things come in twos and threes these days, so it's no surprise that Suitcase is now out in a new version: Suitcase II.

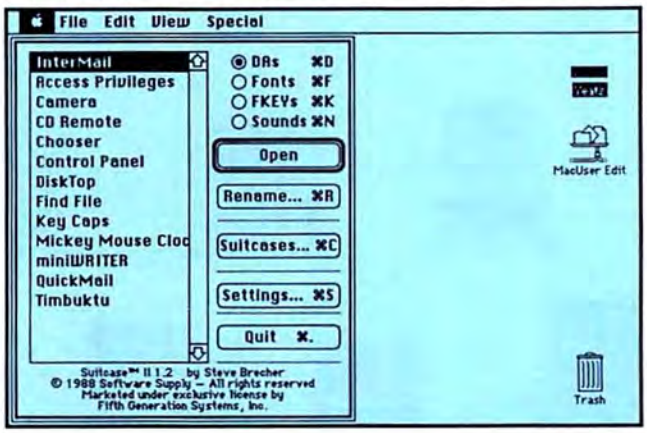
This new version of the handy font/DA management utility is a major revision that makes up to 99 font/DA, Fkey, or beep files available as if they were part of your System. And each of those 99 files can contain up to 500 font sizes, 52 DAs, or an unlimited number of Fkeys or beeps.

Among the new features are menu display of each font in the font itself, the ability to open Suitcase files as read-only for accessing on networks, and the capability to rename or renumber DAs and Fkeys without resorting to another program like ResEdit.

Suitcase II also comes with two new utilities: Font Harmony, which resolves font numbering conflicts automatically, and Font and Sound Valet, which compresses screen fonts and beeps by up to 60 percent and then uncompresses them as they're read from the disk.

Suitcase II lists for $79; current owners can upgrade for $25. To order your new bags, contact Fifth Generation Systems, 11200 Industriplex Blvd., Baton Rouge, LA 70809; (504) 291-7221.

— Russell Ito



Suitcase II lets you manage more than just your fonts and DAs. Now you can add FKEYs and beep sounds to your luggage.

MaraThon Mac

Speed isn't everything — it's the only thing, at least in computers. With this in mind, Dove Computer has launched the MaraThon series of accelerators and connectivity add-ins.

There are two 16-megahertz SE accelerators in the line, one of which, the MaraThon 020, is a renamed version of the company's earlier Mach II/SE board. The MaraThon 020 comes in four versions listing from $899 to $1,999. The MaraThon LAN 020 includes an Ethernet adapter, and it comes in four configurations that list from $1,499 to $2,499. The pricing depends primarily on whether the boards are equipped with an additional megabyte of 256K RAM, and/or a 68881 math coprocessor.

Mac II owners can get the jump on their Mac IIx rivals with the MaraThon 030, a 33-megahertz Mac II accelerator ($1,599). And for those leery of high speeds, the MaraThon 030 comes in 20-megahertz ($999), and 25-megahertz ($1,299) models to help ease you into the fast lane.

Mac II users who need to break through to the Big Blue world can latch onto the MaraThon MC and SP serial/parallel adapters. The SP ($299) offers one Centronics parallel port and one RS-232-C serial port; the MC ($499) adds an RS-449 serial and an RS-530 serial port in addition to those available on the MaraThon SP.

You can find out more from Dove Computer, 1200 North 23rd St., Washington, NC 28405; (919) 763-7918. Happy speeding.

— Russell Ito

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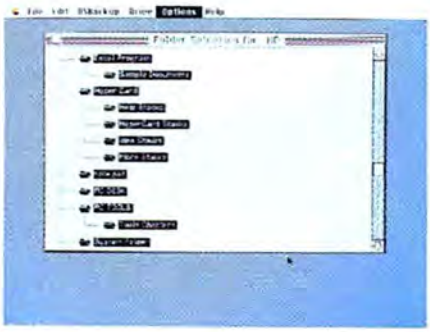
In fact, with the addition of InBox, TOPS now offers a total connectivity solution. Whether you're using Macs, PCs or any combination, exchanging files, sharing peripherals or sending E-mail messages can all be done easily and transparently. No matter what your needs are, TOPS has the solution.

So either call your nearest InBox dealer or call us at 800-445-TOPS (or 415-769-8700 from outside the U.S. and Canada). Or write, TOPS, 950 Marina Village Pkwy, Alameda, CA 94501.

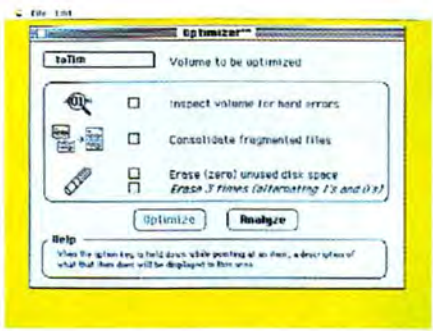
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The #1 Tool Kit.



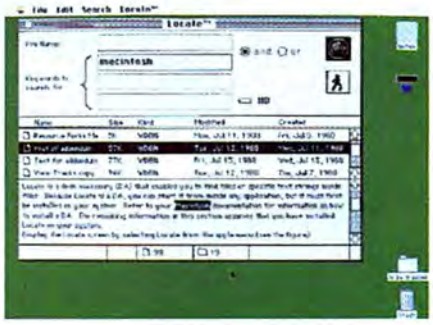
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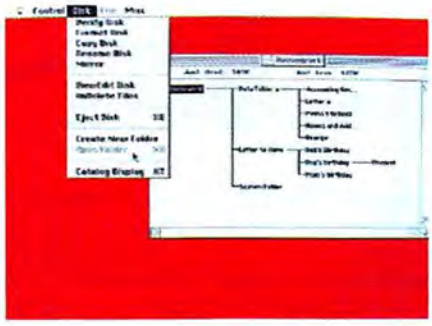
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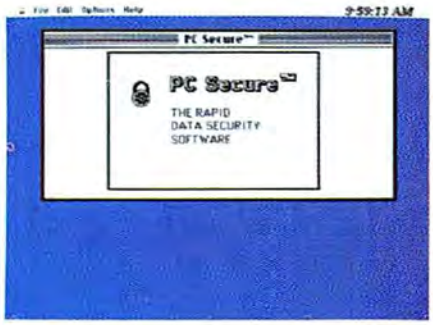
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NEW ON THE MENU

Surfin' DMA

Anyone who read our NuBus article in last month's issue knows that DMA (Direct Memory Access) is a hot topic (if you didn't read it, you can take it on faith, or go back and read it now). DMA makes coprocessing possible, and since coprocessing is the computer equivalent of division of labor, that translates into more work getting done faster. With that in mind, Jets Cybernetics has begun shipping SurfBoard, a NuBus DMA card.

SurfBoard is a SCSI DMA device that takes over all SCSI I/O functions from the Mac CPU, thereby allowing simultaneous computation with SCSI I/O and increasing the SCSI data transfer rate from 0.95 to 2.5 megabytes per second. (Sounds like a Wang ad, doesn't it?)

SurfBoard is compatible with A/UX and comes with an A/UX driver. In multitasking situations, SurfBoard can actually make less RAM seem like more by optimizing the paging process whereby a program regularly swaps segments of itself between disk and RAM. Using SurfBoard, disk access and computation can occur simultaneously, and with the increased swapping rate, it's possible to fit larger applications into the same amount of RAM — without a horrendous slowdown in performance.

You can buy your own SurfBoard for $995. So if it sounds like surf's up to you, contact Jets Cybernetics at 540 Bryant Street, Palo Alto, CA 94301; (415) 323-7070.

— Russell Ito



Surf's up! It's the SurfBoard DMA card from Jets Cybernetics.

As the WORM Turns

We may live in the disposable society, but when it comes to data, we seem to hoard more than we throw away. With that in mind, Storage Dimensions has introduced the MacinStor (guess they couldn't afford the extra *e*) line of large-capacity SCSI hard-disk drives, along with an 800-megabyte SCSI WORM drive.

The hard-disk drives range in size from 45 to 630 megabytes, and in price from $1,240 to $7,999. They're available in both internal and external configurations, and three of the external models are designed to fit under a Mac Plus or SE.

LaserStor (still no *e*) is Storage Dimensions' WORM drive. It's an external model that comes with a single, removable 800-megabyte cartridge. Its suggested price is $4,999.

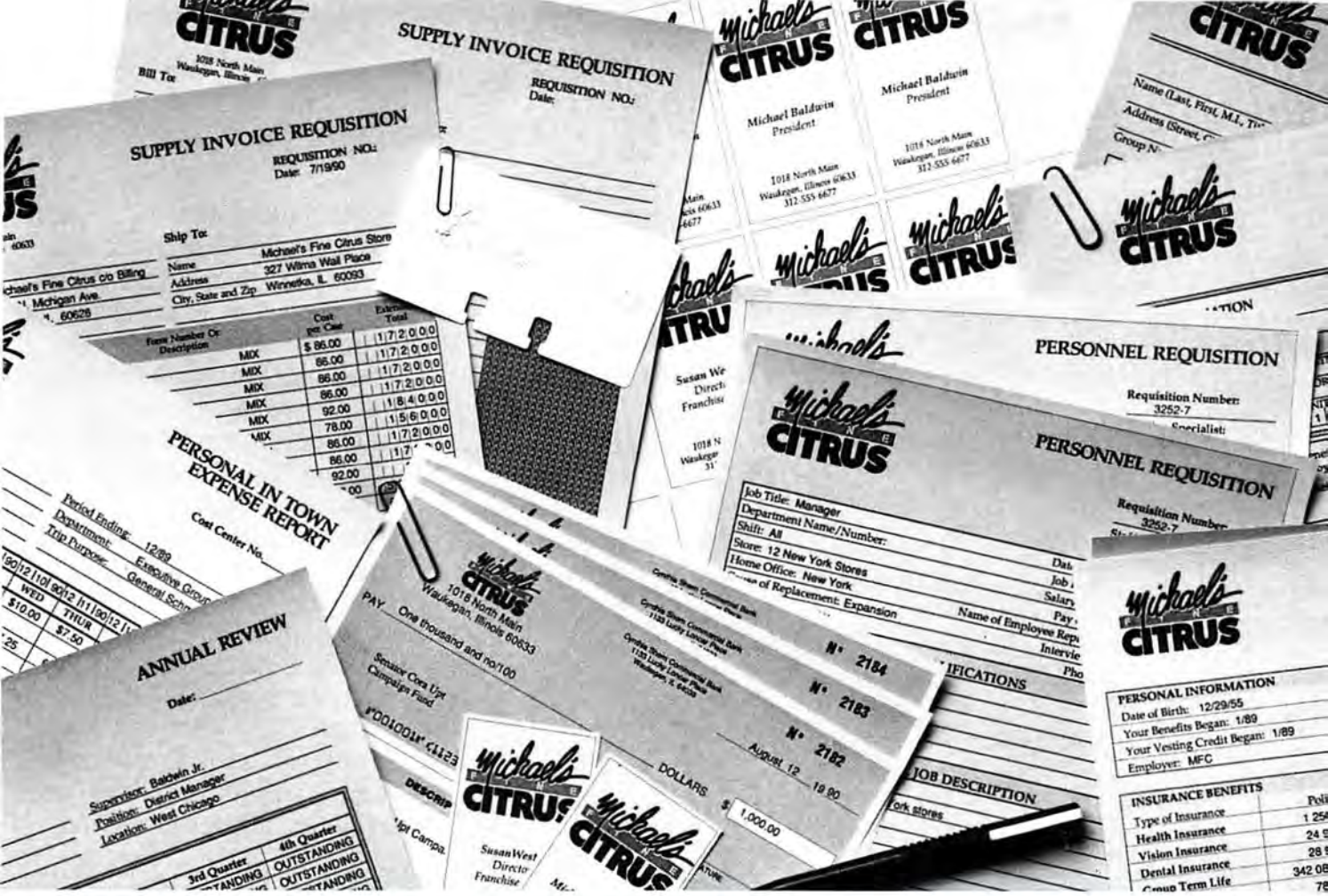
So to increase the size of your mass storage to the electronic equivalent of a landfill, contact Storage Dimensions at 2145 Hamilton Ave., San Jose, CA 95125; (408) 879-9330.

— Russell Ito



If you've run out of disk space, maybe it's time for a WORM.

PETER A. GOULD



Cricket Chirps Again

Cricket Paint is a monochrome paint-only program that stays true to MacPaint's comfortable painting interface but adds new tools and pleasant surprises under every icon.

Its flagship feature is the FreshPaint mode, which lets you treat the most recently drawn object as a separate entity that can be moved, resized, rotated, reshaped, and refilled until you "dry it."

If you wish, you can "undry it" back to FreshPaint and edit it some more. This feature is available for most shapes, including the freehand line, and it's worth its weight in SIMMS. But if you feel overwhelmed, you can turn it off.

Artsy features include Bezier curves, dithered graduated area fills in the four basic directions plus radial, a two-nozzle airbrush, and the ability gradually to lighten or darken a selected area.

Ellipses, rectangles, rounded-corner rectangles, and parallel lines can be rendered with anywhere from 1 to 16 border lines with variable spacing between them.

In the power tools section, you'll find the Spyro Polygon (no, not the former vice-president), which can produce a huge variety of rosettes as you adjust three sliding scales.

Once you settle on a pattern, you can draw as many copies as you wish. Draw a shape with the Rotated Polygon tool, and Cricket Paint will replicate it around a central point, in increments you specify.

The Block tool draws a rectangular solid in the proper perspective based on its location on the document. You can even convert FreshPaint objects or lassoed selections into your own customized library of stamps, each with its own icon.

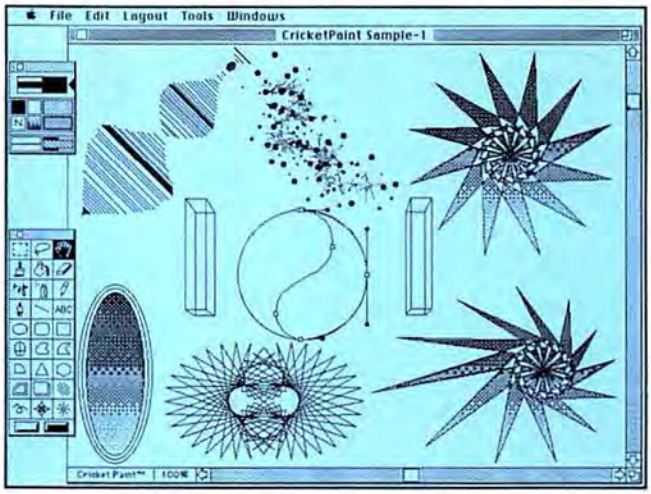
Cricket Paint can open multiple documents in sizes from 8-x-10 to 11-x-17 inches, in landscape or portrait orientation, and for those big high-resolution jobs, you can use a disk or RAM for working space.

Cricket Paint can open MacPaint, PICT, PICT2, and TIFF files, and can save Cricket Paint and TIFF paintings at resolutions of up to 300 dots per inch (dpi). It saves MacPaint and PICT files at 72 dpi only.

You'll need a Macintosh Plus, SE, or II, with at least 1 megabyte of memory. A hard disk is recommended for the program, but is not required.

You can become a monochrome Matisse for $195. Cricket Software, Great Valley Corporate Center, 40 Valley Stream Parkway, Malvern, PA 19355; (215) 251-9890.

— *Salvatore Parascandolo*



Some of Cricket Paint's more unusual tools were used to produce this museum-quality piece.

Success

The road to success will always be paved in triplicate. But with new SmartForm™ software and Macintosh personal computers, it's no longer the tollway it once was.

The SmartForm concept is simple: you can't reduce the paperwork, so reduce the amount of paper. And the printing, shipping and storage costs that go with it.

SmartForm Designer™ includes all you need to whip out crisp, professional forms in a hurry. Fields, lists, check boxes, grids, combs, lines, ovals, rectangles—everything. And their sizes and locations can be pinpointed to the exact inch, centimeter, point or pica.

Type flexibility is almost unlimited. You can reverse, condense and expand fonts, adjust leading and

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NEW ON THE MENU

Milo, a Minderbender

In most word processors, words and mathematical expressions coexist about as comfortably as Run-D.M.C. at the Met. Solving this dilemma has generally meant getting a dedicated math program to supplement you word processor, but Paracomp has just released an all-in-one solution: Milo.

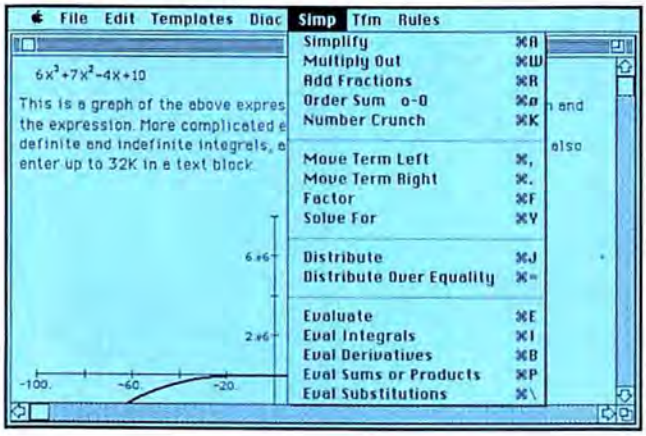
Milo is a mathematics processor with some basic word-processing features as well as graphing capabilities. Unlike some programs, Milo is completely WYSIWYG, so you don't have to learn any complicated programming protocols to create your expressions. And since Milo is also a math processor, it can not only write your equations, it can solve many of them, too.

Among the functions supported are trigonometric, definite, and indefinite differentials and integrals; ordinary and partial derivatives; limits; and Taylor's series. It also comes with tables of formulas that you can modify or extend.

And for those occasions when Milo's text blocks aren't big enough, it's also compatible with MacWrite, WriteNow, Word, and FullWrite Professional. (See "Information, Please" in the December '88 issue for more information, please.)

Milo ($249.95) is available from Paracomp, 123 Townsend Street, Suite 310, San Francisco, CA 94107; (415) 543-3848.

— Russell Ito



It's a word processor! It's a math processor! It's two, two processors in one! It's Milo from Paracomp!

Touch and Feel

Everyday, the Mac reaches out to more of mankind. And, with help from Berkeley System Design and TSI, the blind can reach out and interact with a Mac. Using inTOUCH software from Berkeley System Design in conjunction with TSI's Optacon II, blind users can feel what's on their screen.

Optacon, first developed in the early '70s, is a system that uses a hand-held camera to scan a document and display words, one letter at a time, on a pad of vibrating pins. Optacon II includes a built-in computer interface that works with inTOUCH, a utility that



Bringing a whole new meaning to touch and feel, TSI's Optacon II lets the blind feel the Mac interface.

PETER A. GOULD

takes many forms.



The SmartForm system lets you design professional-quality business forms on a Macintosh. Then lets anyone with a Macintosh fill them in.

customize type sizes from 4 to 127 points.

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Then, SmartForm Assistant™ lets everyone else in your company fill in your forms on a Macintosh. Quickly and accurately. But it won't let anyone tamper with your designs.

With the SmartForm system, all your forms are stored on a Macintosh. You don't print a copy until you've filled one out.

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Finally, SmartForm will integrate with your other Macintosh software. So you can easily transfer information from forms to spreadsheets or databases.

If all this sounds like great form to you, call 800-3CLARIS, ext. 500, for more details. And learn how you can turn a paper loss into a real gain.

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drives the interface. The inTOUCH software lets a blind user take advantage of the Mac's "visual" interface. It allows the user to read the Mac screen while moving the mouse (instead of reading the screen with a camera).

TSI will distribute inTOUCH ($395) and Optacon II ($3,395). For more information, contact TSI at 455 North Bernardo Ave., Mountain View, CA 94043; (415) 960-0920. Contact Berkeley System Design at 1700 Shattuck Ave., Berkeley, CA 94709; (415) 540-5535.

— Kristi Coale

Tools of the Trade

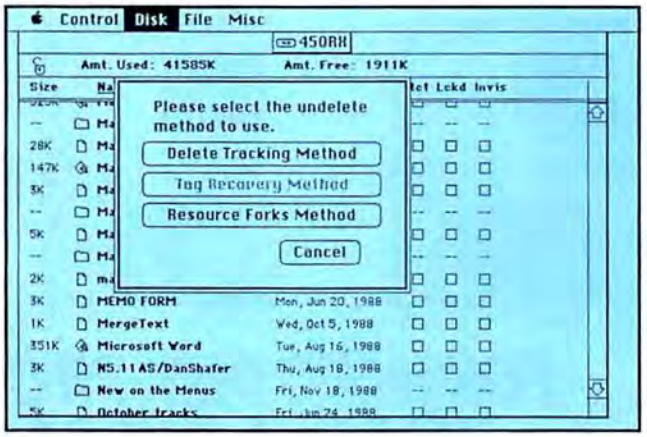
You can always do a job better and faster if you have the right tools. The same is true with your Mac. PC Tools Deluxe, by Central Point Software, is a tool-cabinet--sized collection of utilities and data recovery applications that can help you recover your files when your hard disk crashes — or back up your hard disk quickly and easily *before* it crashes.

PC Tools Deluxe includes FastCopy, MacTools, Mirror, Optimizer, PC Backup, Locate, and PC Secure. FastCopy formats and copies disks faster than the Finder, and its Track Editor can diagnose and repair damaged disks.

MacTools provides pull-down menu options for many of the jobs the Finder does (copying, renaming, and deleting files or disks) and many that it does not.

Extra-Finder features include three kinds of file recovery (Delete Tracking, for hard disk recovery; Tag Recovery, for disks; and Resource Forks, for floppy and hard disks) as well as the ability to undelete even fragmented files and to recover discarded trash.

MIrror protects the data on your hard-disk drive from crashes, mistaken initilialization and deletion, and viral infections. Mirror saves the contents of your hard disk, and Rebuild reconstructs it after a hard-disk crash. Better yet, PC Backup offers full or incremental backup, as well as full or selective restore.



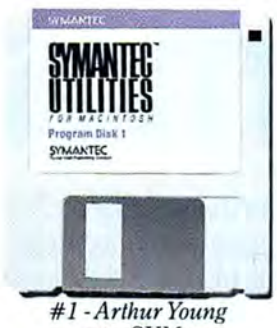
PC Tools' MacTools lets you select the best recovery method for your lost files. Among PC Tools' other goodies are: FastCopy, Mirror, Optimizer, PC Backup, Locate, and PC Secure.

Files can be found quickly with the Locate desk accessory, which permits searches by filename or key words or phrases. The Locate function can work in the background under both Finder and MultiFinder.

You can copy and paste, add text to the Clipboard, and create a list of found files. And your confidential files can be kept safe with PC Secure, which encrypts, compresses, and hides sensitive files on your desktop.

All this help and protection is available for $79. For more information about PC Tools Deluxe, contact Central Point Software at 15220 N.W. Greenbrier Parkway #200, Beaverton, OR 97006; (503) 690-8090.

— Laura Johnson



#1 - Arthur Young uses SUM



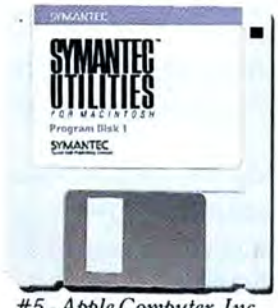
#2 - Hughes Aircraft Company uses SUM



#3 - Northern Telecom uses SUM



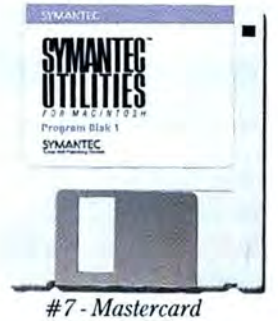
#4 - ACIUS, Inc. uses SUM



#5 - Apple Computer, Inc. uses SUM



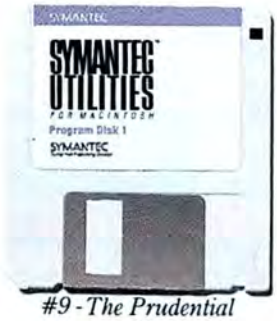
#6 - American President's Co. uses SUM



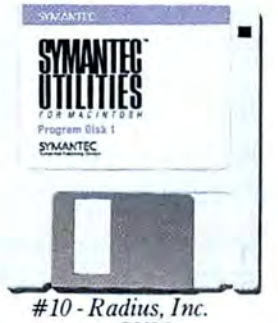
#7 - Mastercard uses SUM



#8 - Paramount Pictures uses SUM



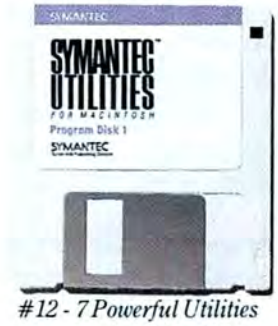
#9 - The Prudential uses SUM



#10 - Radius, Inc. uses SUM



#11 - 100's of Positive Reviews



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Current SUM Users can upgrade to new Version 1.1 by sending your current SUM disk and check or money order for $10.00 to SUM Upgrade, Symantec Corporation, 10201 Torre Ave., Cupertino, CA 95014. MacZap users call 408/446-9994 for a low cost upgrade. HD TuneUp, QuickCopy, and Disk Clinic are all trademarks of Symantec Corporation. Other products are trademarks of their respective holders. © 1989 Symantec Corporation

Quick Clicks

GRAPHICS

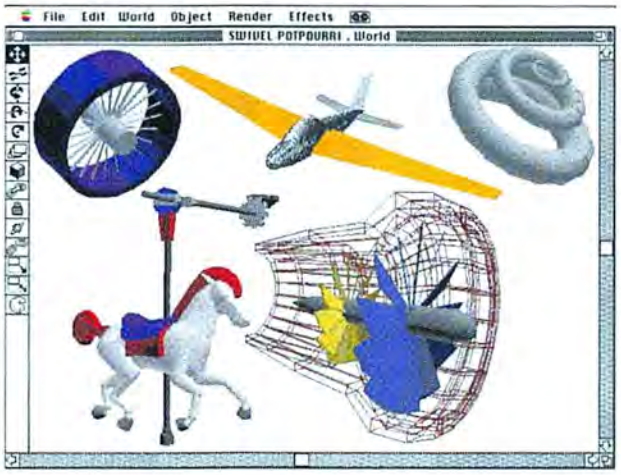
Swivel 3D

Along the spectrum of 3-D programs, Paracomp's Swivel 3D is on the artistic end, as opposed to the micrometrically precise CAD end. But wrapped in its artsy exterior are excellent rendering speed, modeling accuracy, and a unique ability to link 3-D elements in a machinelike structure. Swivel 3D forms fully shaded solids quickly on the Mac Plus and SE, and on the Macintosh II it's very swift, smooth, and shows full color. Swivel 3D can cast true shadows of objects onto other objects, and it can project color graphics onto their surfaces to give them texture. It can easily serve as a multipurpose tool for pure graphic design, visualization, presentation, and even animation.

You do much of your work using its unintimidating tool palette, the Shift, Option, and Command keys, and good ol' double-clicking. To create a new object, you draw its basic cross section, top, and side views, which Swivel 3D converts into a solid. In Swivel 3D's concept of cross section, size means nothing; only shape matters. Whether you're creating a ball, a bat, or a bottle, you start with a circle of a fixed size. The other two views that you trace determine how that basic cross-sectional shape will be repeated, resized, and distorted to form the object's true cross sections. My early attempts with this scheme produced some pretty weird stuff, but practice bred predictability. Now when I outline a fuselage, I don't wind up with a flounder. (Paracomp promises that version 1.1 of Swivel 3D will make this mode less confusing.) You can move an object's center of rotation anywhere, even outside the object, letting you set up a wide variety of pivoting relationships. Three-dimensional shapes can be rendered as wire frames, unshaded solids, contour maps, and as fully shaded objects. You can select a different rendering mode for each object. There's a single diffuse light source that you can position anywhere on your side of the 3-D world.

To manipulate objects in space, you can select the x-, y-, or z-axis tool and drag an object with it, thereby spinning the object around that axis. You can select an object and specify pitch, yaw, and roll angles in a dialog box. The slickest of all methods is dragging an object with the Option or Command key depressed. That way, it's possible to spin an object in space simultaneously along any two axes, examining and positioning it as if it were in your hand. To resize an item, you have similar options — special tool, dialog box, or Shift-drag. To move an object left/right or up/down, you simply drag it with no keys depressed.

But seriously, folks, here's what makes Swivel 3D swivel: It can link items to build structures of varying mechanical properties. Links can form locked clumps, ball joints that permit components to pivot but not separate, or free links whose parts slide and move independently but still remain a family that can travel together. As in real-world gadgets, you link subparts to a main part or parent object. Anything linked to a parent is its child. Given a car chassis, a door, and a door handle, you would link the door as a child of the chassis, and the handle as a child of the door. Moving the chassis moves the door and the handle; swinging the door moves the handle, but not the chassis; and flipping the handle moves nothing else. You can specify how much motion each child object is allowed relative to its parent, limiting,



This is Swivel 3D's simple palette and a few of my Swivelite acquaintances. Note the mixed rendering modes. The carousel horse is part of an art collection that comes with the program. I tinkered together the rest in my desktop garage.

The Five-Mouse Rating

🖱🖱🖱🖱🖱	EXCELLENT
🖱🖱🖱🖱	VERY GOOD
🖱🖱🖱	GOOD
🖱🖱	FAIR
🖱	POOR
💣	DOESN'T WORK

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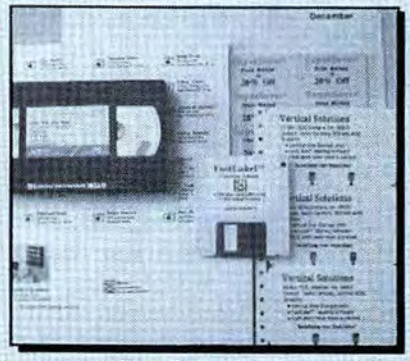
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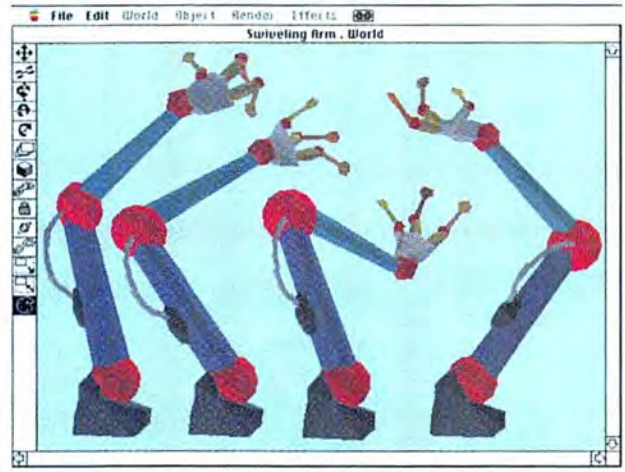
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Quick Clicks



Each segment of the arm is a separately movable object connected to its parent with a ball-joint link. Models and their components can be freely worked and reoriented and stay in one piece. Handy, isn't it?

for example, the swing of a door to 80 degrees or permitting a piston to travel no more than 1 inch in either direction. To aid in placement or mechanical simulation, each object can have its own custom grid to control its position and attitude. All aspects of an object are editable at any time. Even while linked, objects can be reshaped, resized, colored, and substituted. This feature set alone lets you create models that you and others can operate without fear of tearing them apart. The link feature can also be used effortlessly to make offset duplicates such as wheel spokes and progressively mutated copies of an item.

Swivel 3D also has *tween animation,* in which you specify a start and end point of a movement and how many frames to create between those two points. Swivel 3D fills in the rest. You can select a mode in which the camera moves through the scene under tween control. You can thus fly the viewer around your 3-D space. It understands a command language with which you can create and animate a 3-D scene using a text file prepared with such applications as spreadsheets and word processors. Swivel 3D can save animation frames and scenes as individual files or as scrapbook pages, in bit-mapped or object-oriented format.

The package includes two versions of Swivel — one for single-megabyte Macs and one for multimeggers. They're functionally identical, but one manages memory differently to live within the confines of less RAM. You also get enough ready-made art to get you started or inspired — sets of alphabet letters in both uppercase and lowercase, a human figure with swivel-jointed torso, head, and limbs, items that show Swivel's forming talents, and assemblies that showcase its mechanical abilities.

Is Swivel better than something else? Is air better than water? It all depends on what you need, and how comfortable you'll be with its interface. Each Macintosh 3-D application is vastly different from every other, and it's difficult to compare them objectively feature for feature. Swivel 3D outshines Super 3D 1.0 in the color and speed categories, and its priceless mechanical links have no counterparts in other software in its class.

Not to rave, but if you're a graphic artist, designer, modeler, or sculptor, you should add Swivel 3D to your tool kit before daybreak tomorrow.

— *Salvatore Parascandolo*

Swivel 3D



List Price: $395
Published by: Paracomp, 123 Townsend St., Suite 310, San Francisco, CA 94107; (415) 543-3848.
Version: 1.0
Requires: Mac Plus with 1 megabyte (2 megabytes recommended).
Compatibility: Mac II and MultiFinder friendly.
Application Size: 362K
Copy Protection: None

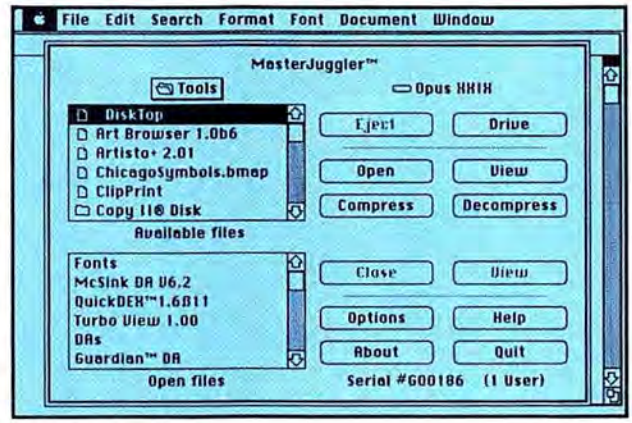
MasterJuggler

The first do-it-all font- and DA-enabling programs have been available for almost two years now. Those first programs, including MasterJuggler's direct ancestor, Font/DA Juggler Plus, seemed to have all the features you could ever want. MasterJuggler, a member of the latest generation, works even more smoothly and transparently and adds many new and useful features. In fact, the older programs now seem very plain and bland — although they're really not — by comparison.

As you'd expect, MasterJuggler allows constant access to hundreds of fonts, DAs, Fkeys, and sounds. You don't have to install them in your System file or deal with the System's limits. MasterJuggler can open up to 12 files (each of which can contain numerous DAs, fonts, sounds, and Fkeys) at a time. The files don't have to all be in the same place or even on the same disk volume. They can be anywhere, including on your network file server.

Considering how many features MasterJuggler offers, access to all of them is easy. Most MasterJuggler features can be accessed in a variety of ways.

The number of features in MasterJuggler is enormous. The files with your DAs, fonts, and so on have to be opened only once. After that, MasterJuggler remembers them and automatically reopens them whenever the Mac is started.



In the MasterJuggler main screen you select the files that are to be opened each time you start your Mac, set your Options, and examine the contents of suitcase files.

Considering how many features MasterJuggler offers, access to all of them is easy. Most MasterJuggler features can be accessed in a variety of ways; you elect what's best for you in an extensive Options dialog box. For example, if you desire, you can access all of MasterJuggler's features via pop-up menus.

To help you make the most of MasterJuggler, there are commands to let you examine the contents of your suitcase files both before and after opening a file. Fonts and sounds can be automatically compressed to save space. They're opened on the fly as they're required. The space savings are typically 35 percent for fonts and somewhat less than that for sounds. The savings can be significant, since sound and font files tend to be large.

MasterJuggler also lets you open an application or document from within any application without returning to the Finder. In MultiFinder, the Application list also lets you switch to other open applications and hide, if you want to, the current application's windows before switching.

Those are just some of MasterJuggler's features. The DA list lets you open any DA directly from the keyboard. The Font list can display the names of installed fonts as the fonts actually appear.

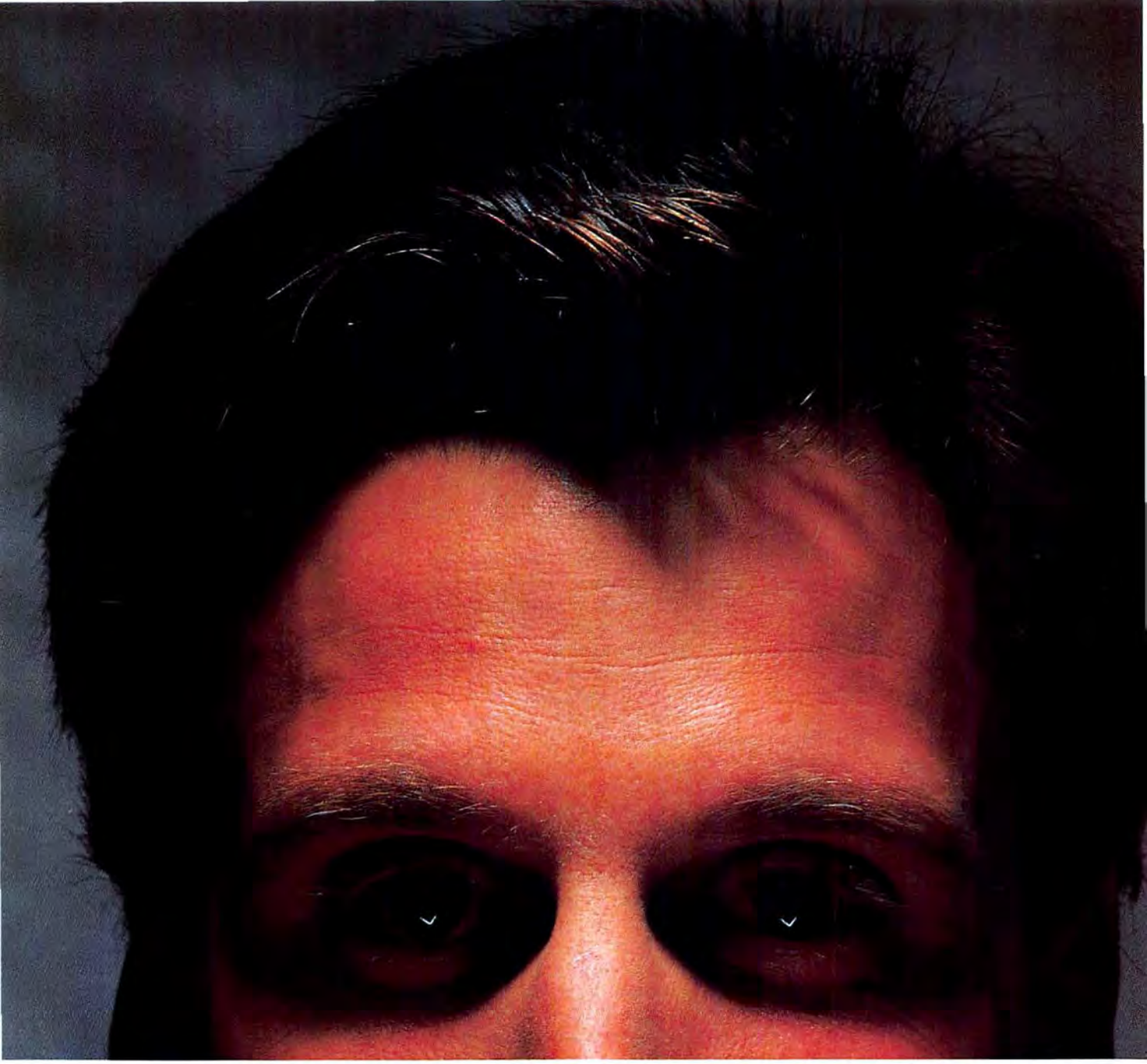
You can also make any font the default application font. The Fkey list lets you open Fkeys from the keyboard by name, thus avoiding numbering conflicts. The Sound list allows you to play sounds and to choose a sound to play in place of the standard System beep.

There's lots more. FontShow lets you see (or print) a font or fonts in all possible size and style combinations. HotSounds allows you to assign sounds to many Macintosh operations. KeyChains lets you open multiple applications (particularly useful if you run MultiFinder) or play multiple sounds with one command. ResConflicts shows and prints any name or number conflicts among the fonts, DAs, Fkeys, and sounds currently available. The included JugglerUtilities can then be used to resolve the conflicts, if you so desire.

MasterJuggler comes with an attractive, well-written manual, a separate booklet that covers the utilities, Read Me files for late-breaking information, and good on-line help. (If you have a space problem, the help screens can be removed, saving about 35K.)

The JugglerUtilities consist of Font/DA Utility, which can rename and renumber fonts and DAs; FKey/Sound Mover, which is used to copy, rename, renumber, or remove Fkeys and sounds; Resource Resolver, which will automatically resolve font- and sound-numbering conflicts; and Sound Converter, which plays and converts SoundCap, SoundWave, and SoundEdit files to Macintosh II or HyperCard sound resource files (which is what MasterJuggler plays).

The disk also includes the latest version (3.8) of Apple's Font/DA Mover. You need to use this version (or a later one) to gather your fonts and DAs into large files. ALSoft also provides a sampling of public-domain sounds (248K worth), DAs (102K), fonts (32K), and Fkeys (3K) to get you started with MasterJuggler. As is usu-



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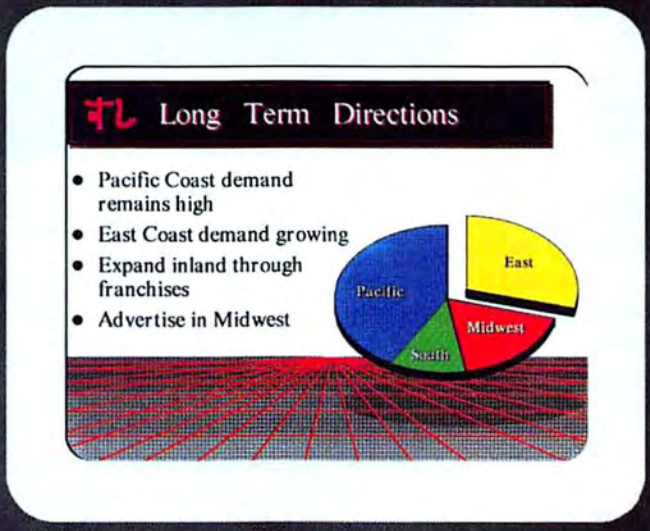
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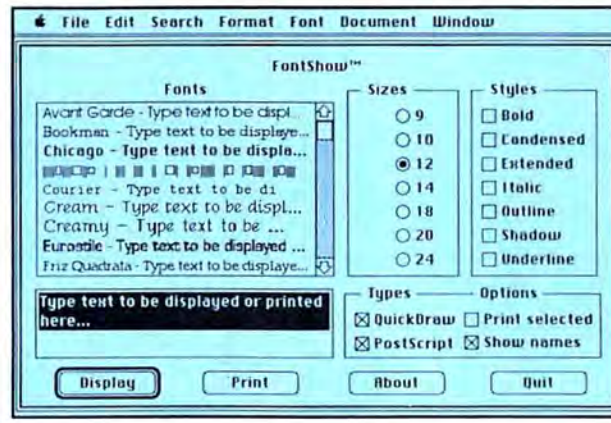
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Quick Clicks



MasterJuggler's Font List can show font names in the fonts themselves, and FontShow (shown here) can display actual samples of your fonts in any size or style.

al with such collections, there are some gems and some bland programs, but overall it's a nice selection.

MasterJuggler is normally accessed through the submenu of a hierarchical menu. I found that method a bit awkward. However, there are so many other ways to get to the features that this wasn't a problem. My preferred method is to hold down the Shift key as I select MasterJuggler from the Apple menu. That causes the normal DA list to be replaced by the MasterJuggler submenu. You might prefer a keyboard equivalent of your own choosing.

The only real limitation I found (and it's well documented) is MasterJuggler's inability to use laser printer drivers other than Apple's. Thus, if you want to use downloadable PostScript fonts with, say, PageMaker, FreeHand, or Persuasion, you'll need to install them as though MasterJuggler wasn't there (or use Suitcase II).

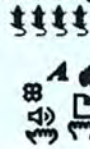
Comparisons between MasterJuggler and Suitcase II are inevitable. Both are world-class programs that do roughly the same things. MasterJuggler has a clear lead in the number of useful features it provides, while Suitcase II has a slightly more slick, elegant, and intuitive interface. The MasterJuggler utilities will be very useful for both average and power users and are the sort of utilities that you tend to use frequently. The Suitcase utilities are aimed more at power users who have lots of sounds and fonts and use them heavily but much less frequently.

Ultimately your decision will be one of personal choice (unfortunately, you can't run both programs at the same time). I've waffled. I have two Macs that I use regularly. One has MasterJuggler installed; the other runs Suitcase II.

Remembering the days of 15 DAs and lots of fonts in the System, I'm still amazed and awed by programs like MasterJuggler. I wonder how I got along without one. Yet I'm certain that this superb program will have to be down-rated next year to allow the next version to take over at the top of the utilities heap.

— Steven Bobker

MasterJuggler



List Price: $79.95
Published and Sold Exclusively by: ALSoft, P.O. Box 927, Spring, TX 77383-0927; (713) 353-4090.
Versions: MasterJuggler, 1.0; Resource Resolver, 1.01; Font/DA Utility, 1.12; Sound Converter, 1.00; FKey/Sound Mover, 1.10. Single-user version reviewed; multiuser versions that allow multiple copies of MasterJuggler to run on a network at the same time are available.
Requires: 512K RAM
Compatibility: All Macs. MultiFinder friendly.
Application Sizes: MasterJuggler, 208K; Resource Resolver, 24K; Font/DA Utility, 28K; Sound Converter, 25K; FKey/Sound Mover, 27K.
Copy Protection: None

OmniPage

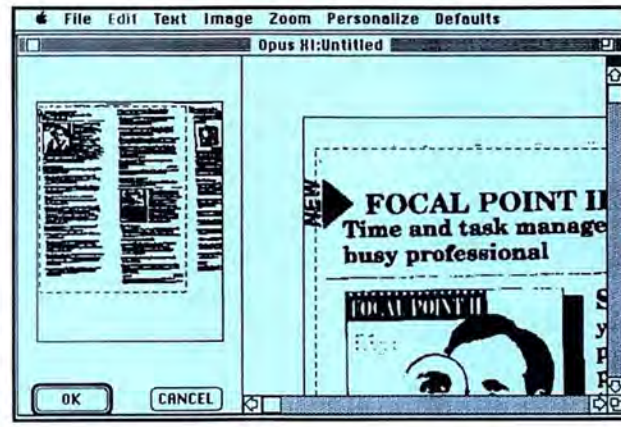
Optical character recognition (OCR) has grown up with a vengeance recently, and no program better exemplifies OCR's new maturity than OmniPage. OmniPage takes in whole pages at a gulp and spits out the text it finds with speed and accuracy.

It's an exceptionally intelligent program straight out of its very slick and attractive packaging, requiring none of the laborious teaching most OCR programs require. Install it, launch it, scan, and read the resulting text file. It really is just about that simple.

And it really works, more often than not. Of course, it's a picky eater, recognizing only plain fonts and nice, not-too-shiny paper. OmniPage can't read type larger than 72 points (1 inch high), nor will it deal with italic, most boldface, or any styled font. It can't even be taught these fonts. It also refuses to read most dot-matrix output, so you can't scan in ImageWriter printouts.

The paper that is being scanned is surprisingly important. Even a moderate gloss can throw OmniPage off. At least there's a simple solution for this problem. Photocopy the material on any plain-paper copier, and OmniPage will have no trouble. This is an annoyance but not an irreconcilable limitation like the inability to read styled fonts.

OmniPage makes heavy hardware demands. It wants a Mac II, IIx, or SE with a 68020-based accelerator, and it wants that machine to have at least 4 megabytes of RAM. If you need to add memory to run OmniPage, then OmniPage becomes a very expensive program. It wants all this computing power and memory so it can keep you from falling asleep at the keyboard. It does that by keeping the whole file it's working on in memory. And it works on uncompressed TIFF files that frequently exceed 1 megabyte in size. Since it also creates large temporary files as it works, you need to allow for at least 3.1 megabytes if you plan to run it under MultiFinder (I'm not kidding; its SIZE resource is set at 3,072K).



The preview scan at the left shows the area selected (in the dashed rectangle) to be read. The view on the right shows the area in full size. OmniPage knows enough to ignore areas of graphics, but it'll have some trouble as it tries to read the vertical NEW and triangle. The selected area should be reduced to eliminate problem text wherever possible.

Caere, OmniPage's publisher, offers a special version that runs on a normal (unaccelerated) SE. You still need the 4 megabytes of memory, however. If you elect to use this option, be prepared for some substantial waits as pages are processed. If you plan to handle any volume at all, you're better off adding the accelerator card and using the full-speed version.

The version of OmniPage reviewed works with the Apple Scanner and the Hewlett-Packard ScanJet. Caere should have drivers for the DEST and Microtek scanners by the time this review appears, and a driver for Agfa scanners is also being developed. If you have another scanner, you can still use OmniPage but the process is cumbersome. You have to create and save the page as an uncompressed TIFF file using the scanner's native software and then open it from within OmniPage.

Basic operation, assuming you're using one of the supported scanners, is simple. Place your document on the scanner, set the contrast and brightness (or use the defaults for the first pass), and scan. While you'll get better results if you take some time to optimize the scan, I found most material worked well (if it worked at all) with the default settings. The preview scan should appear sharp, but without any extra "dirt" that might confuse the program.

After the scan is completed, a thumbnail of the page appears in the upper-left corner. Select the area from which you want OmniPage to extract the text. An actual-size, zoomed view that allows very precise selections is available to help you precisely define the selected area. Then, if you've selected the Manual Galley mode, indicate the order in which the text blocks are to be scanned. This handy feature lets you omit material like captions and pull quotes that don't belong with the text.

Now tell OmniPage to read the scan. It does this rather quickly, generally picking up speed as it moves through a page. However, it will slow down on lines of partial characters as it tries to make sense of them. The solution to this problem is to exclude carefully that kind of material when picking the areas of the image to work with. On-screen highlighting shows the program's progress.

The results appear in an editable file. That file can be preset to be a text file, a text file without Returns, a MacWrite file (essentially unformatted), or an Excel-compatible (tab-delimited) file, which can be read by most spreadsheet and database programs.

Characters that can't be read are replaced with the tilde (~) character. As with all OCR programs, you have to check the results carefully for accuracy. It'll sometimes miss and not know it. But when OmniPage is doing well, it's more accurate than any other OCR I've used; expect about 98 or 99 percent accuracy. When OmniPage is off, it's very obvious, and you should go back to step one (the original scan).

One problem with the resulting files is that each covers only a single scanned page, and there's no way to append new material to it. That means that long files must be hand-joined at

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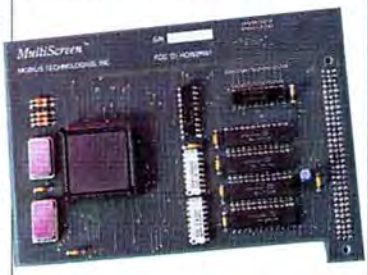
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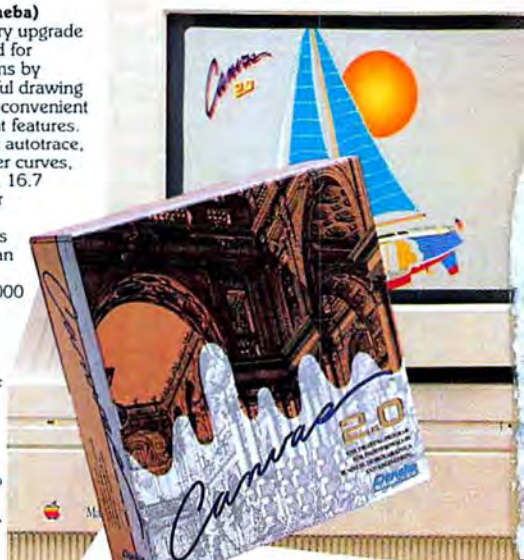
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FoxBASE+/Mac 208

Canvas 2.0 (Deneba)
This revolutionary upgrade sets the standard for drawing programs by blending powerful drawing capabilities with convenient easy-to-use paint features. Features include autotrace, multi-point Bezier curves, unlimited layers, 16.7 million colors for 24-bit Mac II support, hairlines to 1/1,000th of an inch, improved precision to 64,000 dpi, PostScript gray scales in one-degree increments, TIFF and bit-map editing, and zoom capacity ranging from 3% to 3,000%. *(graphics)* **$169.**



FREE OFFER



The MacWarehouse technical staff and the publishers of the popular Power User's Manual have put together a great new disk of utilities, desk accessories and applications. THE POWER USER'S TOOL KIT. Seventeen great programs including Raymond Lau's Stuffit. There's even a powerful word processor you can install as a desk accessory.



And here's the best part. The Power User's Tool Kit is free with any purchase from MacWarehouse. You pay only $1.50 for shipping and handling if you want the disk. The programs are shareware, so you can try the software free of charge. If you wish to continue, some authors ask that you send them a small fee ($5 - $25). Some of the programs are absolutely free. All of the details are explained on the disk, which is yours to keep anyway.

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SuperPaint 2.0 (Silicon Beach Software)
Get the freedom of Paint and the precision of Draw in a single program! More than 25 new features including Airbrush, calligraphy brushes and customizable arrows. Mix fonts, styles and sizes. Rotate text and objects. Great for giving clip-art a professional look. *(graphics)* **CALL.**

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The Cutting Edge 800K disk drive's attractive styling, quiet performance, and high-tech reliability make it our most popular floppy drive. The drive uses ASIC technology to reduce the number of parts, increasing reliability and reduce weight. Features an LED light to indicate disk access and a hinged door over the disk insertion slot to keep the mechanism clean. Uses standard Apple formatting routines and supports the Macintosh's standard software eject features. Features manual eject mechanism also. One year warranty. *(disk drives)* **$175.**



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A TOTAL INPUT SYSTEM from CAD to Desktop Publishing. Kurta's built in software features a menu strip for access to 11 to 23 programmable function keys. Using a tablet makes it possible to get "absolute positioning" making CAD drawings, desktop publishing and other applications much simpler. Move the screen cursors, draw sketch and trace more precisely than with a mouse. *(input/output)* **$255.** Also available 4 Button Cordless Cursor **$95.**



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Thunderscan
Converts your ImageWriter into a scanner with special effects such as rotation, linescreens, captions, and frames of various sizes. It is packaged complete for the Mac 512K, 512KE, Plus and SE *(input/output)* **$199.**



SuperLaserSpool 2.0
SuperLaserSpool lets you use your Mac while printing documents — no more waiting! LaserQueue accessory lets you control when and where your document is printed - even allows you to preview your spooled documents. *(utilities)* **$82.**

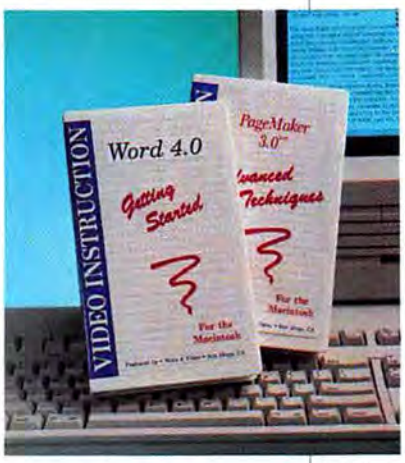


MacMoney 3.02
This versatile, powerful and intuitive accounting package from Survivor Software is a full double-entry personal bookkeeping system and financial planning tool. Integrates with MacInTax. *(finance)* **$62.**

Aldus
PageMaker 3.0 ..... 399.
Broderbund
DTP Advisor ..... 47.
Letraset
Image Studio or Ready,Set,Go! ..... 279.
Olduvai
Read-It! 2.0 *(OCR)* ..... 199.
Quark
Xpress or QuarkStyle ..... Call.
Solutions
SuperGlue 1.05 ..... 52.
Springboard
Springboard Publisher ..... 109.
Target
Scoop ..... SPECIAL 189.

NETWORKING PRODUCTS

Connect Inc.
MacNet ..... 43.
Farallon
Timbuktu 2.0.1 ..... Call.
Nuvotech
TurboNET ..... 30.
SuperMac
Network DiskFit ..... 199.
TOPS
TOPS 2.0 ..... 119.



Video Instruction (Voice & Video)
Breeze through Mac software like Pagemaker 3.0, Word 4.0 and Hypercard with the ease of an old pro. You'll have your very own one-to-one trainer on videotape. Each program is simple and easy to use, averaging 90 minutes in length with graphic examples. Titles include **"Getting Started"** for **Word 4.0**, **Pagemaker 3.0** and **Hypercard. "Advanced Techniques"** cover new software features for **Word 4.0** and **Pagemaker 3.0.** All the programs are professionally tested and produced. It's an entertaining, easy way to get the most from your programs! *(education)* **$35.** each tape

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Adobe
Fonts ..... Call.
Altsys
Fontastic Plus 2.0 ..... 54.
Letraset
LetraStudio ..... 369.
LetraFonts *(various)* ..... ea 59.
Olduvai
ArtFonts ..... 59.

CAD/CAM

Graphsoft
MiniCad Plus ..... 525.
Innovative Data
MacDraft 1.2a ..... 155.
Dreams ..... 315.
Micro CAD/CAM
MGMStation *(professional CAD)* ... Call.

FINANCIAL AND ACCOUNTING SOFTWARE

Aatrix
Payroll 3.5 ..... 99.
Payroll PLUS ..... 159.
Bedford
Simply Accounting ..... 219.
Intuit
Quicken ..... 33.
MECA
Managing Your Money ..... 128.
Monogram
Business Sense ..... 279.
Dollars & Sense ..... 81.
Softview
MacInTax Federal '88 ..... 69.
TaxView Planner ..... 64.

Extended Keyboard Carry Case (Targus)
Pamper your Mac with a Targus carrying case made of Zilicone treated nylon to give you water-proof durability and an impact absorbing high-density foam layer with a soft protective lining for complete protection. Cushioned shoulder pad and handles provide extra comfort and convenience. Plus there's room for everything from your Mac, a hard disk drive and the Extended Keyboard to pockets for your mouse, floppies, cables and pens. *(accessories)* **$69.**



Survivor
MacMoney 3.02 ..... 62.

STATISTICAL ANALYSIS

Abacus Concepts
StatView II *(req. Mac II, or Plus/SE w/68881 co-processor)* ..... 349.
StatView SE+Graphics ..... 229.
BrainPower
StatView 512+ *(requires 512k)* ..... 175.
D2 Software
MacSpin 2.0 ..... 189.
Odesta
Data Desk Professional ..... 289.
Paracomp
Milo ..... 169.
Select Micro Systems, Inc.
Exstatix ..... 219.

Software for Recognition Tech
MacEqn ..... 24.

MUSIC AND SOUND

Coda
MacDrums ..... 32.
Perceive ..... 52.
Electronic Arts
Deluxe Music Construction 2.5 ..... 84.
Farallon Computing
MacRecorder *(records sound)* ..... 139.
Great Wave
ConcertWare + MIDI 4.0 ..... 79.
Impulse
Audio Digitizer w/SoundWave ..... 149.
Intelligent Music
OvalTune ..... 95.
Opcode Systems
Music Mouse ..... 39.
Passport Designs
Master Tracks Pro ..... 259.
NoteWriter ..... 169.

EDUCATIONAL/ PERSONAL

BrightStar
Alphabet Blocks ..... 32.
Talking Tiles ..... 69.
Bootware Software
ResumeWriter Pro ..... 75.
Broderbund
Calculus, Geometry, Physics ea. ..... 59.
Type ..... 20.
Davidson
Math Blaster ..... 27.
Speed Reader II ..... 39.
Great Wave
Kids Time ..... 26.
Learning Company
Reader Rabbit ..... 33.

MacVision 2.0 (Koala)
Turn your video camera into a scanner! MacVision accepts any standard NTSC signal including camcorder, VCRs, videodiscs and DC players. It digitizes and displays an image 640 pixels wide by 480 lines high, with 256 shades of gray. It stores images in TIFF, RIFF, MacPaint, and EPS file formats, so you can export them to Image Studio, Pagemaker, and even to Hypercard! MacVision digitizes 3D objects from any video source! *(input/output)* **$225.**

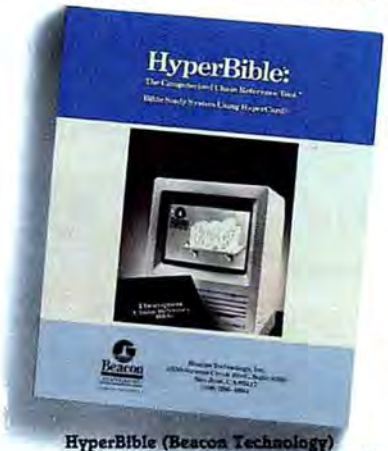


MORE FOR YOUR MONEY...

Odesta
Double Helix II ..... 339.
Double Helix II MultiUser Kit ..... Call.
GeoQuery ..... 199.
Park Row Incorporated
Publish or Perish ..... 21.
Personal Bibliographic
Pro-Cite ..... 199.
Software Discoveries
Record Holder Plus ..... 45.

BUSINESS SOFTWARE

Access Technology
Trapeze 2.1 ..... 159.
Ashton-Tate
Full Impact ..... 249.
Bravo
MacCalc ..... 79.
BreakThrough Productions
Market Master ..... 185.
Market Master R/A ..... 245.
Claris
MacProject II ..... 395.
Cognition Technology
MacSMARTS 3.2 ..... 135.
Cricket
Cricket Graph ..... 119.
Cricket Presents ..... 289.
MicroPlanning International
MicroPlanner Plus ..... 385.
Microsoft
Excel 1.5 ..... 249.
PowerPoint 2.0 ..... Call.
Works 2.0 ..... 189.



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The Computerized Chain Reference Tool puts new life into your study of the Bible, using HyperCard's interface. Over 100,000 notes and cross references, Atlas, 7000 topics and Glossary of Terms. Interface to any word processor. Easy word and phrase search of scripture. Ready made studies for meetings. Available in the New International Version **$195**. and the King James Version **$159**. Great gift item! *(hyperware)*

Nolo Press
For the Record ..... 29.
WillMaker ..... 34.
North Edge Software
Timeslips III *(time/expense tracking)* 117.
Satori
Bulk Mailer 3.2 ..... 79.
Shana Enterprises
FastForms! Construction Kit ..... 89.
Softview
FormSet ..... 55.
MacInUse ..... 42.
Spectrum Digital
TrueForm ..... 269.
Symantec
More II ..... 225.

WORD PROCESSORS AND OUTLINERS

Ashton-Tate
FullWrite Professional ..... 269.
Claris
MacWrite 5.0 ..... 105.
Microsoft
Word 4 *(updated word processor)* . 249.
Write 1.0 ..... 113.



Cirrus Drive Kits (La Cie Ltd)
With these kits and your choice of a 3 1/2" embedded SCSI drive, you can put together your own internal, or external drive for any SCSI-equipped Mac. Internal kits come with a universal bracket; external kits come with the award-winning Cirrus case and a Cordura Carrying bag. Kits come with SilverLining and SilverServer software. *(disk drives)* **CALL.**

Niles & Associates
End Note ..... 82.
Paragon
Qued/M ..... 109.
Symmetry
Acta Advantage w/DA ..... 69.
T/Maker
WriteNow 2.0 ..... 109.
WordPerfect Corp.
WordPerfect ..... 185.

SPELLING CHECKERS

Aegis
Doug Clapp's Word Tools ..... 42.
A.L.P.
MacProof 3.0 ..... 115.
Deneba Software
Bigthesaurus ..... 53.
Spelling Coach Pro ..... 105.
Microlytics
Word Finder *(synonym finder)* ..... 33.
Sensible Software
BookEnds ..... Call.
Sensible Grammar ..... 54.
Working Software
Spellswell 2.0 ..... 45.

GRAPHICS

3G Graphics
Images w/Impact
Graphics & Symbols 1 ..... 59.
Business 1 ..... 75.
Aba Software
Draw It Again Sam 2.0 ..... 79.
GraphistPaint II ..... 289.
Aldus
Freehand 2.0 ..... 349.
Broderbund
Drawing Table ..... 79.
PosterMaker Plus ..... 36.
TypeStyler ..... Call.
VideoWorks II ..... 175.
CE Software
CalendarMaker ..... 27.
Claris
MacDraw II 2.0 ..... 329.
MacPaint 2.0 ..... 105.
Cricket
Cricket Draw ..... 169.
Cricket Paint ..... **SPECIAL** 99.
Pict-O-Graph *(color on the Mac II)* ... 99.
Deneba
Canvas 2.0 ..... 169.
Dream Maker
Cliptures, Business Images ..... 97.
MacGallery ..... 28.
Electronic Arts
Studio/8 ..... 319.
Microlllusions
Photon Paint ..... 179.
MicroMaps
MacAtlas Pro *(MacDraw format)* .... 129.
NuEquation
NuPaint ..... 99.
Olduvai
Art Clips ..... 69.
Paracomp
Swivel 3D ..... 265.
Silicon Beach
Digital Darkroom or Super 3D ..... Call.
SuperPaint 2.0 ..... Call.
Solutions
Curator *(graphics management)* ..... 79.
SuperMac
PixelPaint Pro ..... Call.
Symmetry
PictureBase & WetPaint ..... 99.
T/Maker
ClickArt EPS Illustrations ..... 75.
Zedcor
Deskpaint 2.0 ..... 69.

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Adobe
Ace-Textures, Fill, and Patterns ..... 168.
Illustrator 88 ..... 319.
Streamline ..... 295.

Managing Your Money
A fully integrated software program addressing every aspect of personal and small business finance. Write and print checks, set up a personal budget, estimate your taxes and more. *(finance)* **$128.**



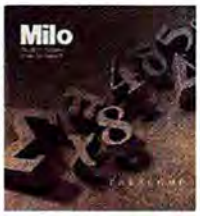
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Save time storing and retrieving information. It's the easy way to search for references and edit them. Rearrange data any way you like. Makes smooth sailing out of sorting and organizing. Great for research papers and articles. *(spelling)* **CALL.**



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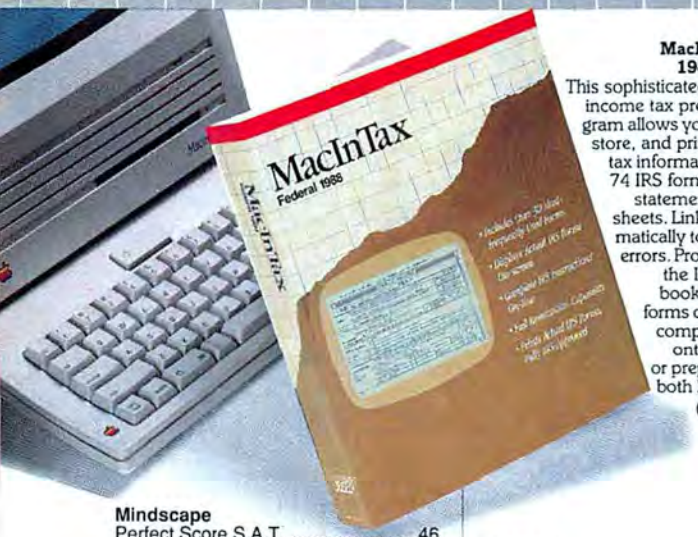


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MacInTax Federal 1988 (Softview)
This sophisticated, easy to use income tax preparation program allows you to organize, store, and print out income tax information. Includes 74 IRS forms, schedules, statements and worksheets. Links forms automatically to reduce input errors. Program features the IRS instruction booklet on-line. All forms can be printed, complete with data onto blank paper or preprinted forms, both IRS approved. *(finance)* **$69.**

Mindscape
Perfect Score S.A.T. ..... 46.
Simon & Schuster
Typing Tutor IV ..... 35.
The Software Toolworks
Mavis Beacon Teaches Typing ..... 36.
Voice & Video
HyperCard Getting Started ..... 35.
PageMaker 3.0 Video Tape ..... 35.
Word 4.0 Video Tape 35

GAMES

Access Software Inc.
World Class Leader Board ..... 34.
Artworx
BRIDGE 5.0 ..... 22.
GrailQuest ..... 19.
Broderbund
Ancient Art of War At Sea ..... 27.
Shufflepuck Cafe ..... 22.

MacTilt (Ergotron)
Neck and back pains disappear like magic when you put your Mac on a MacTilt. You'll be more productive when those aches and pains from improper viewing angles go away. MacTilt raises your screen 4 inches off the desk and gives you a swivel and tilt joint so you can fine-tune your viewing angle and minimize glare. The tilt covers a 30 degree angle and the swivel goes around a full 360. *(accessories)* **$68.**



Where in the World is
Carmen San Diego ..... 25.
Bullseye
Ferrari Grand Prix (racing) ..... 32.
P51 Mustang ..... 32.
Casady & Greene
Crystal Quest 2.2 w/Critter Editor .... 42.

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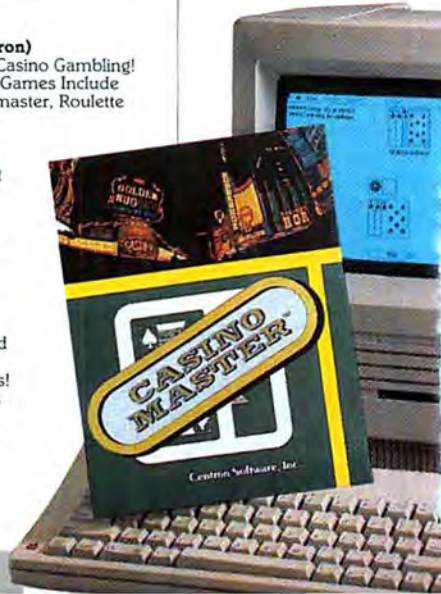


Centron Software, Inc.
BlackJack or CrapsMaster ..... ea 27.
CasinoMaster *(5 pack)* ..... 55.
Discovery Software
Arkanoid ..... 27.
Electronic Arts
Chessmaster 2000 *(deluxe chess)* .. 28.
Patton vs. Rommel *(strategy)* ..... 15.
Starfleet I: The War Begins ..... 37.
Chuck Yeager Adv. Flight Trainer .... 32.
Epyx
Sub Battle Simulator ..... 29.
Infocom
Leather Goddess of Phobos ..... 15.
Micro Sports
MSFL Pro League Football ..... 32.
Mindscape
Balance of Power, Deja Vu - ..... ea 30.
Shadowgate, Uninvited - ..... ea 30.
Nemesis
Go Master ..... 49.
Joseki Tutor ..... 30.
PCAI
MacCourses ..... 32.
MacGolf 2.0 ..... 35.
MacGolf Classic ..... 54.
Road Racer ..... 45.
Sierra ON-Line
Leisure Suit Larry ..... 23.
Silicon Beach
Apache Strike, Dark Castle - ..... ea 27.
Beyond Dark Castle ..... 27.
Simon & Schuster
Star Trek:Kobayashi Alternative ..... 24.
Spectrum HoloByte
Falcon 2.0 ..... 32.
PT109, Gato ..... ea. 26.
Solitare Royale or Tetris ..... ea 20.
The Software Toolworks
The Hunt for Red October ..... 29.

DISK DRIVES/ MEMORY UPGRADES

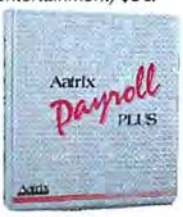
1 MEG SIMMS ..... Call.
AST
Mac286 Co-Processor *(Mac II)* .... 1079.
CMS
CMS TapeStack 60 Meg ..... Call.
MacStack 20 Meg ..... 569.
MacStack 40 Meg ..... 789.
MacStack 60 Meg ..... 849.
Cutting Edge
800K Disk Drive "NEW" ..... 175.
Wedge XL 30 Plus ..... 629.
Wedge XL 45 Plus ..... 829.
XL 30 Internal or 45 Internal ..... Call.
Dayna Communications
DaynaFile single 360K *(5 1/4")* ..... 529.
Dove
MacSnap 2S ..... 750.
MacSnap 2SE ..... 439.
MacSnap 4S ..... 1488.
MacSnap 8S ..... 2975.
MacSnap SCSI Interface Port ..... 109.
MacSnap 524E *(512k to 1 meg)* .... 289.
MacSnap 524S ..... 379.
MacSnap 548E *(512k to 2 meg)* .... 549.
MacSnap 548S ..... 599.
MacSnap Plus 2 ..... 439.
MacSnap 1024 Mem. Exp. Board . Call.
MaraThon SP ..... 189.
MaraThon Accelerators ..... Call.
Everex
EMAC 20D *(hard drive)* ..... 520.
EMAC 20D Deluxe *(O footprint)* ..... 585.
EMAC 40D Deluxe *(O footprint)* ..... 995.
EMAC 60T *(tape backup)* ..... 895.
EMAC FS-102 ..... 2495.
Impact Hard Drives ..... Call.
La Cie Ltd.
3.5 Mounting Kit w/SilverServer & SilverLining ..... 99.
Cirrus Drive Kits ..... Call.

Casino Master (Centron)
Become a Master of Casino Gambling! Five separate Casino Games Include Blackjack Ace, Crapsmaster, Roulette Master, Pokermaster and Baccarat Master. Learn and practice at your own pace! Exact table simulation, mouse controlled betting, selectable bankroll, stored win/lose statistics and complete manual for rules and strategy included for each game. Recommended and used by professional gamblers! Buy individual games **$27** ea or get the 5-game Casino Master Package **$55.** *(entertainment)*





World Class Leader Board
Play the courses that challenge the greatest golfers or create your own. Digitized sound, practice putting greens and driving range. Choose your club, distance and type of shot. For 1 to 4 players. *(entertainment)* **$34.**



Payroll PLUS
This complete payroll program provides Federal, State, Local, and FICA tables plus 8 user-defined miscellaneous deductions. Calculates hourly wages or salary. Prints paychecks and more. *(finance)* **$159.**



Swivel 3D
Swivel 3D is the ONLY 3D drawing program with color and it's fast. Start with 2D drawings and Swivel's intuitive interface turns them into 3D objects. Use the "Tweening" function for animation. Comes with a library of pre-drawn images and supports PICT and MacPaint files. *(graphics)* **$265.**

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The BIG Thesaurus
Contains over 100,000 root words from the Merriam-Webster Collegiate Thesaurus. Inserts replacement words directly into your document. Compatible with Multifinder and Hypercard. *(spelling)* **$53.**



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High capacity diskettes with no capacity for error. Every bit, every bite on every track of each BASF 3.5" Diskette is certified 100% error free. Warranted for life. *(media)* **$17.**



MediaMate
Have all your programs at your finger tips! MediaMate holds 10 3 1/2 inch disks in an easy access design. When not in use, it folds up for easy storage. *(accessories)* **$12.**



Spelling Coach Professional
Complete on-line spelling and reference system includes Merriam-Websters's 158,000 word dictionary. 245,000 synonym thesaurus, hyphenation, and a dictionary with 85,000 real definitions. (spelling) **$105.**



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45Mb Raw Int. Drive Kit ..... 549.
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MultiScreen Video Card ..... 349.
PCPC
MacBottom HD21 (SCSI) ..... Call for
MacBottom HD32 (SCSI) ..... special
MacBottom HD45 (SCSI) ..... 859.
MacBottom HD21 w/Modem ..... 779.



MAC - 101 Keyboard (Data Desk)
Features 101 keys including a numeric keypad, a separate T-shaped cursor keypad, Cancel Key, Option and Command keys at both ends, definable function keys, plus scrolling, page control, and zooming keys. Comes with free macro software and manufacturer's two year warranty. *(input/output)* **CALL.**

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MacBottom HD45 w/Modem ..... 979.
WSI *(With SCSI Interface)* ..... 269.
Peripheral Land, Inc.
Infinity Turbo 40 Meg ..... 1299.
UniMac
3.5 or 5.25 Int. Mounting Kits ..... Call.
Storware ..... 69.

MODEMS

Abaton
InterFax 12/48 ..... Call.
Best Data Products
SmartOne 2400/1200 with cable and software ..... 169.
Everex
EMAC 2400 ..... 225.
Hayes
Smartmodem 1200 ..... 299.
Smartmodem 2400 ..... 449.
Smartmodem 9600 *(V series)* ..... 985.
Migent
Pocket Modem *(ext. 300/1200 baud)* 115.
Prometheus
Promodem 2400 ..... 309.
Shiva
NetModem 1200 ..... 359.
Supra
Supra Modem 2400 ..... 149.
US Robotics
Courier 1200 Modem ..... 199.
Courier 2400 Modem ..... 349.

BLANK MEDIA

B.A.S.F.
DS/DD *(box of 10)* ..... 17.
Sony
DS/DD *(box of 10)* ..... 19.
SS/DD *(box of 10)* ..... 13.

INPUT/OUTPUT

Asher Engineering
Turbo Trackball *(512/Plus or Se/II)* .. 69.
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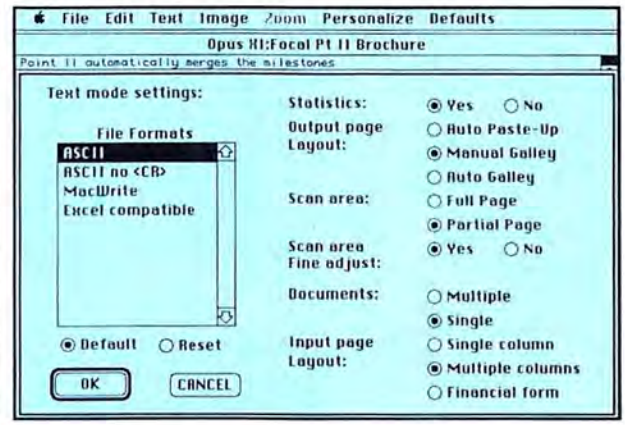
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Quick Clicks



Part of a text file generated by OmniPage. Note the tilde (~) characters where it couldn't read some characters, and notice the error in the last line (*rire* for *fire* and *lip* for *up*). All OCR results must be carefully proofread.



This is OmniPage's Format Selection and Options dialog box.

some point, which seems unnecessary.

The manual is good but appears more aimed at the casual user than the heavy-duty user. There's also a good tutorial in HyperCard-stack format. Caere also sends registered owners a stack called QuickCard. QuickCard reads any plain text file (up to 30K long) into a scrolling field on a HyperCard card. It can also search the text fields of any stack for any word or any string of characters.

If you already meet OmniPage's stringent hardware requirements, it's reasonably priced and very useful to have around. I use it several times a day just to create note files. It would be a much better program if it had some sort of teaching module and could learn at least some styled or italic fonts.

OmniPage makes OCR technology a lot more accessible to a whole new group of users and has enough horsepower to get it through most simple data entry tasks. It's a good way to get going in OCR.

— Steven Bobker

OmniPage



List Price: $695
Published by: Caere Corp., 100 Cooper Court, Los Gatos, CA 95030; (800) 535-SCAN, (408) 395-7000.
Version: 1.0
Requires: Mac II, IIx, or SE with 68020-based accelerator; scanner; 4 megabytes of RAM.
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Application Size: 599K
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ON THE FLY

6308 Troutmask Lane, Stillwater, Montana
A Memo On The Lures Of Trade



We at *On the Fly* lures want to ensure that the wily, sought-after creatures of the watery world are as captivated with our fishing customers as our customers are with our fine lines of natural, organic hand-tied flies. The line of lures we offer this year will, indeed, reel in customers as never before.

Tackle your fancy.
For the young novice angler looking to launch the hobby with tamer game, *On the Fly* will offer a range of smaller, lighter, less intricate lures, such as the Peanut Piper, the Pumpkin Puff,



the Weedy Wiggle and the Puddle Jumper. These lures are designed for easy handling, both on and off the hook. For the reel man who chums for larger catch, the new additions to our 1989 product line include the Chimmer Swizzler, the FinchDog Fighter, the Man-Boy Behemoth and the Brassy Bottom Bonanza. These additions for 1989, plus the full line of tried-and-true *On the Fly* lures are on the following pages.

Lure, line & sinker.
Our *On the Fly* authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

PROJECTED SALES FOR 1989*		
	CHIMMER	*BONANZA*
100K	NO	YES
50K	YES	YES
25K	YES	YES
10K	YES	YES
5K	YES	YES

Hold the anchovies.
For our customers, we plan to initiate a toll-free 800 number to widely distribute information such as matching lure to fish, bait tips and techniques, hot spots for fishing and spawning cycles. With this service, the fishing line of our market will always be busy.

** SALES FIGURES FOR 1989 ARE JUST A WILD GUESS*

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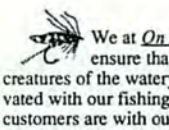
ON THE FLY
6308 TROUTMASK LANE, STILLWATER, MONTANA

A Marketing Memo On The Lures Of Trade

We at *On the Fly* lures want to ensure that the wily, sought-after creatures of the watery world are as captivated with our fishing customers as our customers are with our fine lines of natural, organic hand-tied flies. The line of lures we offer this year will, indeed, reel in customers as never before.

Tackle your fancy.

For the young novice angler looking to launch the hobby with tamer game, *On the Fly* will offer a range of smaller, lighter, less intricate lures, such as the **Peanut Piper**, the **Pumpkin Puff**, the **Weedy Wiggle** and the **Puddle Jumper**. These lures are designed for easy handling, both on and off the hook. For the reel man who chums for larger catch, the new additions to our 1989 product line include the **Chimmer Swizzler**, the **FinchDog Fighter**, the **Man-Boy Behemoth** and the **Brassy Bottom Bonanza**. These additions for 1989, plus the full line of tried-and-true *On the Fly* lures are on the following pages.



The Brassy Bottom Bonanza

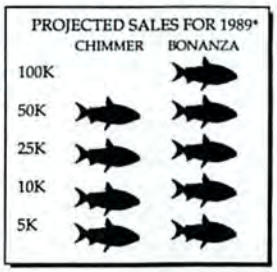


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Our *On the Fly* authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

Hold the anchovies.

For our customers, we plan to initiate a toll-free 800 number to widely distribute information such as matching lure to fish, bait tips and techniques, hot spots for fishing and spawning cycles. With this service, the fishing line of our market will always be busy.



*Sales figures for 1989 are just a wild guess

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Quick Clicks

HARDWARE

Mac II Workstation

It's big, it's gawky, it's expensive, it's heavy, it comes in lots of pieces that you have to assemble. It's awkward when disassembled. It doesn't even photograph well.

That sure sounds like a damning indictment for a computer stand. But the Mac II Workstation is the best, strongest, most versatile computer station you've ever seen. The Mac II Workstation's purpose is twofold: It frees your desk space of computer components, and it makes monitors a lot easier and more pleasant to use.

Having your monitor floating on an arm may not sound like much, but it's by far the best way to mount a monitor. The arm lets you move the screen from side to side, forward or backward, up or down, and you can swivel and tilt it. This sort of control makes finding the best, most glare-free position simple. And if you need to show the screen to someone to one side or the other, just turn it. The arm is so well built and damped that all movement requires just the pressure of a finger or two. However, no matter how hard I shook the frame, the arm never moved on its own. It's real nice work.

The Mac II Workstation, like any semicustom metalwork item, offers a bewildering variety of options. The specific unit reviewed here is a basic vanilla unit. It's a floor-standing, 70-inch–high unit (64- and 78-inch units are also available). Its 30-inch–wide shelf (25-inch–wide shelves and frames are options) is just under 15 inches deep (the only choice). It has one Model A monitor arm (a second arm can be added; there's also a Model B arm for heavier monitors) and a type 1 (or smallest size) monitor carrier — a caddy, in Ergotron's terminology. Two larger caddies are available for bigger monitors (or a Plus or SE). The largest caddy can hold up to 62 pounds.

The Mac II Workstation can be mounted directly to a wall or desk, or you can order it with an integral rolling table (called the Ergotron Design Station). You can elect to add power strips and task lighting. Casters can also be added to any standard freestanding frame. Caddies can be easily swapped for larger or smaller sizes. Ergotron also offers acoustic panels and a keyboard/copy holder that mounts on the front of the caddy.



The Mac II Workstation is a big, solid unit. It looks strong; it *is* strong. It can mount a second arm that will hold a second monitor.

The unit arrives in several boxes and requires a screwdriver and allen key for assembly. A soft-tipped hammer also helps. Assembly is straightforward and takes 15 to 30 minutes. The main frame and shelf are of heavy steel. The unit is exceptionally solid and well made.

The shelf is adjustable over a 6-inch vertical range. Its rated load capacity is 300 pounds. I was a bit skeptical of that claim, so one of my first tests was to (gingerly and carefully) sit on the shelf. I'm not a little guy, and the Mac II Workstation didn't even quiver.

There's plenty of room for a Mac II and peripherals on the shelf. The only thing to keep in mind as you place your Mac II is that its cooling system needs a couple of inches clearance on the left side. It's tempting to just shove the II up against that left-side wall, but don't do it. The slot for the 800K drive is easy to reach, but you'll have to stand up to reach the programmer's switch on the right side.

If you want your cables to be neat and out of sight, you'll need extra long keyboard, monitor, and power cables. You can buy them from Ergotron or another supplier. The cables can be placed in plastic cable troughs that mount to the uprights (or to the wall for wall-mounted units). These cable troughs are not as well finished or as strong as the rest of the Mac II Workstation, but they do the job.

You'll need to add shipping costs to the prices noted in this review. The best thing to do is to call Ergotron and let them quote a price. Single units can cost as much as $75 to ship.

The Mac II Workstation is a solid, space-saving unit that is the best possible home for a Mac II.

— *Steven Bobker*

Mac II Workstation

$$$$



List Price: Unit reviewed, $540. Additional arm, $240; task lights, $80; additional caddy, $75; swap caddy for another size, $45. Shipping not included.

Manufactured by: Ergotron, 3450 Yankee Drive, Suite 100, Eagan, MN 55121; (612) 452-8135 or (800) 888-8458.

Compatibility: Holds up to 300 pounds of equipment. Caddy will hold up to 24-inch monitor (maximum weight of 62 pounds), SE, or Plus.

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Claris CAD can't reduce the huge number of two-dimensional drawings it takes to get a plane off the ground. But it makes them a lot easier to do.



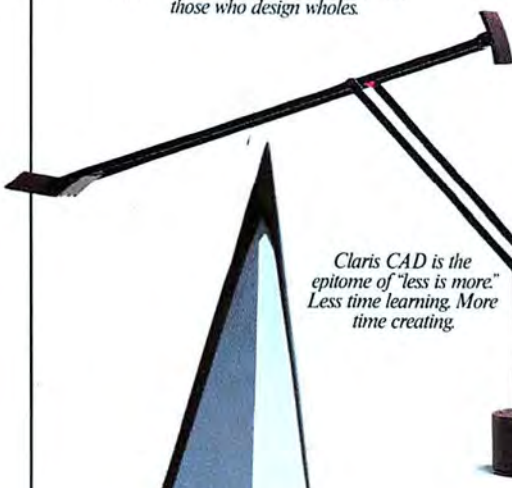
Claris CAD supports ANSI Y14.5 and other drawing standards. So those who design parts can share with those who design wholes.



Accurately drawing graceful curves like these becomes a simple matter of point and click.

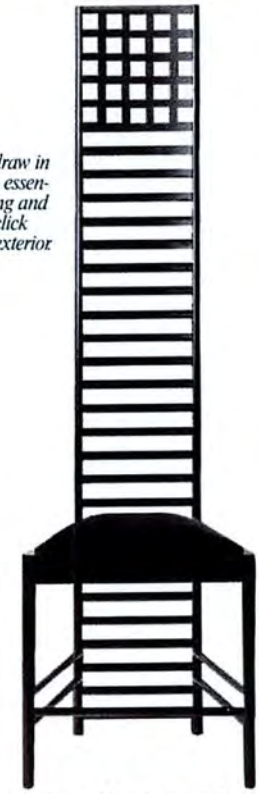


Claris CAD can help you design everything from electronic schematics to the box they come in.



Claris CAD is the epitome of "less is more." Less time learning. More time creating.

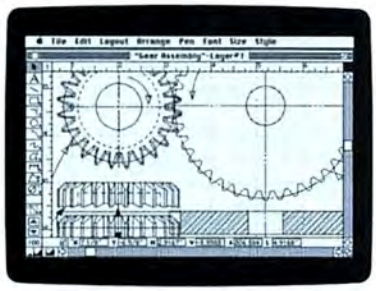
With the ability to draw in layers, you can hide essential details like wiring and plumbing just a click beneath an elegant exterior.



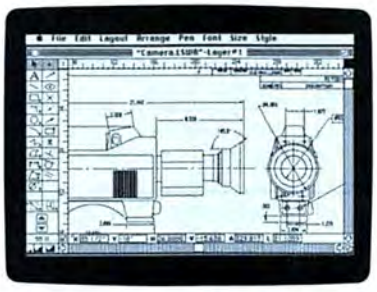
Draw the lines of fine design as finely as you wish: from 1.5 inches to .0001 mm.

© 1989 Claris Corporation, 440 Clyde Avenue, Mountain View, California 94043; **415-962-8946.** Starter Kit includes demonstration software, tutorial workbook and video. Offer expires September 30, 1989. A special

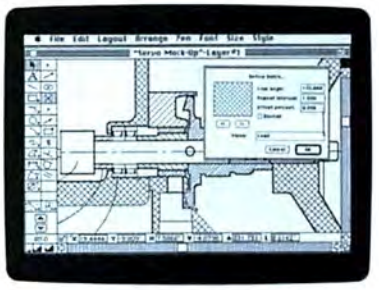
Is to start here.



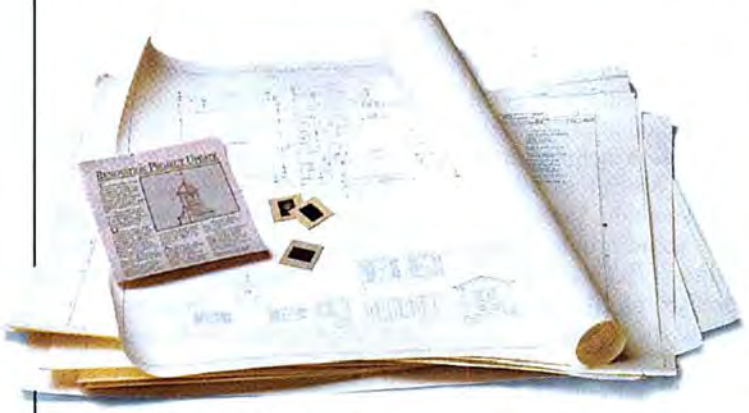
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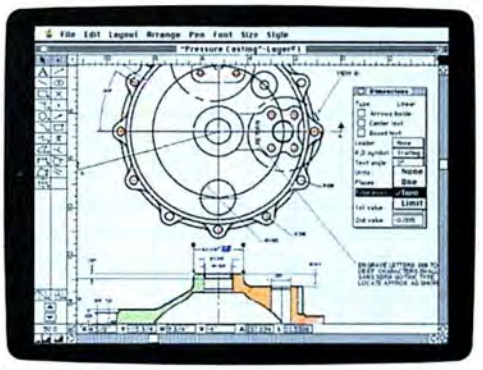
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Quick Clicks

UTILITIES

Copy II for the Macintosh

Copy II for the Macintosh goes back a long way in Mac history. It was originally called Copy II Mac, and when it first appeared about three years ago, the emphasis in the package was on Copy. Now, with the virtual demise of copy protection on productivity software, should you be interested in a new version of such a program?

The answer is yes, because Copy II is now a utilities package whose components are powerful, useful, and, best of all, easy to use.

The actual Copy II application is even more powerful than it was several versions ago, and when used with the complex, detailed information in the manual, it should be able to copy virtually any program. Copy II's most valuable ability might well be its ability to quickly and efficiently copy *unprotected* disks. Disks that appear damaged can sometimes be recovered by simply sector-copying them. In any event, when attempting to recover a damaged disk, you should always be working on a copy. And Copy II is the best way to make that copy.

Along the way, Copy II has added a Track Editor that can often repair damaged disk sectors and can also find and examine copy-protected sectors. This feature is complex and not that easy to use effectively. It's intended for advanced users; if you don't understand exactly what it can do, don't use it. And if you choose not to heed this warning, be aware that you can easily destroy your disk.

The Copy II disk includes an application that shows which applications Copy II will copy. The current version lists hundreds of programs and suggests how best to copy them.

The centerpiece of the package is MacTools, a versatile file-editing utility that works on any disk. MacTools isn't as feature-laden as FEdit Plus but is easier to use and can work in places where FEdit Plus can't. MacTools can do many of the things the Finder does, including copying, deleting, and renaming both files and disks. It can also initialize disks, lock and unlock files, and more.

MacTools can also do a lot that the Finder can't do: verify both files and disks at your command, make invisible files visible and visible files invisible, recover some deleted files, and repair some damaged disks. The file and disk editor portion of the program lets you see all the information on the disk, and, if you know exactly what you're doing, change it. The editing and recovery features are very powerful, if not all that easy to use.

Recovery of deleted files is greatly aided by an INIT (which you place in your System folder) called CPSavDeletes. This works much like the ShieldGuardian combination included in Symantec Utilities for Macintosh (SUM). The package also includes the CPTagFix, which fixes some problems with the ROM in Mac 512KEs and Pluses. It shouldn't be used on SEs or IIs — just be sure to use the current System software.

A new addition to Copy II is the Locate DA. This DA can search, at high speed, for specific filenames, up to three specific text strings inside files, or any combination of filenames and text strings. It can also display its hits in context in the lower portion of its screen. It's as quick, if not quite as versatile, as Microlytics' GOfer.

Locate works in the background, under either MultiFinder or the Finder. And it works well in both environments. That's important, because as fast as Locate is, searching for text strings can be slow.

The manual says that Locate must be installed directly in the System file. It warns against installing it via Suitcase or MasterJuggler. Presumably that's necessary to enable the background searching. However, the publishers of both of these programs thought Locate would work correctly when installed via their programs, and all my testing indicated that Locate works well no matter how it's installed. There's one other minor problem with Locate (and all programs with similar functionality). If you ask it to search for a filename and a null (blank) or single character string, search progress will be glacial. If you're searching for just a filename, be sure that the cursor remains in the filename box and isn't in the first string box.

By far the weakest part of the entire package is the manual. It's not organized well enough for the amount of information it contains. And it's not well written. For the most part, it appears that the publisher has simply added to older versions of the manual. And finally, this 140-page tome doesn't have an index. That's inexcusable.

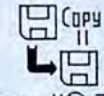
Another underwhelming component of Copy II is Copy II Hard Disk, an application that automatically copies selected software to hard disk. (It can also be used to move protected software to floppies or RAM disks.) Built into the program is a list of copyable programs — only 22 total — and all of the productivity applications are old, totally obsolete versions that no one should be using anymore. Only one or two of the games are current. This application, once very useful, should be dropped.

Copy II for the Macintosh has improved immensely over the years. No one should doubt Central Point's commitment to this program. Copy II belongs in your box of tricks. At a street price around $20, it's a steal.

— *Jake Paden*

Copy II for the Macintosh

$$$$



Copy II® 7.2

List Price: $39.95
Published by: Central Point Software, 15220 N.W. Greenbrier Parkway, #200, Beaverton, OR 97006; (503) 690-8090.
Version: 7.2, except 1.1 for Locate DA.
Requires: Any Mac except original 128K Mac.
Compatibility: Mac II and MultiFinder friendly, but don't use MacTools with MultiFinder.
Application Size: Copy II, 64K; MacTools, 106K; Locate, 34K; Copy II Hard Disk, 31K.
Copy Protection: None

"The best backup solution should offer reliable, fast, convenient, affordable storage of data..."

–MACWORLD, November 1988

"The 45MB removables were among the fastest backup solutions I tested. In fact, they're so fast that it is tempting to use them as hard disks– which is what they are..."
–Rob Halm, MACWORLD November 1988

"...the medium (DataCarts) offers better value for your money than the MegaDrive (Jasmine) or the Totem (Iomega Bernoulli) cartridges."
–Rob Halm, MACWORLD November 1988

"This technology will revolutionize the way people look at hard disks."
–Thomas L. Massie
MASS microsystems founder
MACWEEK, Jan. 26, 1988

"The DataPak is a first-rate drive that I recommend without hesitation!"
–Jim Heid, MACWORLD September 1988

"I've had good luck with the many (45MB DataCarts) I've been using."
–Rob Halm, MACWORLD November 1988

"...you will be overjoyed at how painless backing up can be. They offer the ultimate in flexibility, speed and reliability."
–Rob Halm, MACWORLD November 1988



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Quick Clicks

ORGANIZATIONAL TOOLS

WillMaker

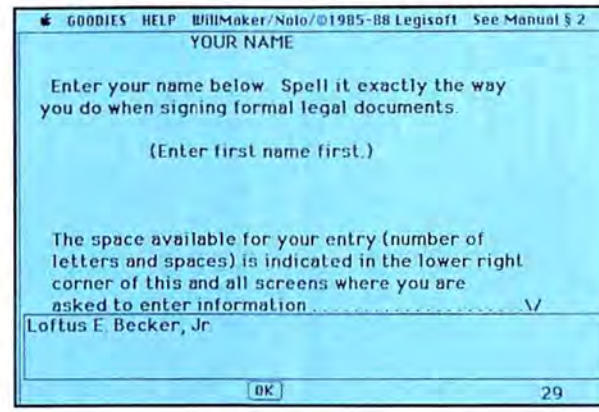
Living well may be the best revenge, but dying without a will is one of the worst. Whatever you want to happen to your property after you die probably won't, and your heirs will be left with a lot of unnecessary cost and confusion.

Not many of us like to think about writing a will, and even fewer like to pay a lawyer to do it; unless a friend will do it for nothing, the tariff will be $75 "and up," as the advertisements say. WillMaker is a simple, but legally fairly sophisticated, program designed to let you generate (and, as necessary, update) a basic will without consulting an attorney. Viewed as a Macintosh program, it's no great shakes. But it does its job reasonably efficiently, and for most people, it can produce as good a will as a lawyer would, in less time and for less money.

> Viewed as a Macintosh program, it's no great shakes. But it does its job reasonably efficiently.

You really do have to read the lengthy but unintimidating manual. It clearly explains who can (and who can't) safely use the program to prepare a will, the important choices the program makes, and some aspects of estate planning that the average person might well overlook. It won't take you more than a few hours, at most, to go over this.

Once you've read the manual, you're ready to run the program. It's a BASIC program (complete with Run-Time Microsoft Basic) jazzed up slightly with a few buttons here and there, but the screens are not very attractive and the program might as well be running on an MS-DOS machine. However, it's simple to operate and works as long as you provide it with accurate information. Entering that information will take from ten minutes to half an hour or so, depending on how many specific bequests you want to make, how many children you have, and so forth. It's simple (although sometimes tedious) to correct errors, and equally simple to update a pre-existing will if, for instance, you have another child. The prolific, however, should know that the program cannot handle more than sixteen children.



A typical data-entry screen. The program's BASIC origins are obvious.

When you're done, WillMaker takes the information provided and produces a complete will using standardized language, some of it taken from the Uniform Probate Code. The will produced can be viewed on-screen or printed out (on an ImageWriter or LaserWriter). However, it can't be saved as a text file and edited — a deliberate (and sensible) choice in a program designed for nonlawyers. An attorney could use the program to prepare modest wills, but people qualified to practice in the field would do better to devise their own forms and work up the final product on a word processor or a program like Legalware's Document Modeler.

I compared the will that WillMaker produced with my own (simple) will, written by an experienced Trusts and Estates law teacher with an active practice. The computer-generated version was a little longer, just as clear, and in one or two cases added language that was (in the event of some unlikely but not impossible circumstances) a slight improvement.

Wills are important, and if you don't have one, you should. You should consult an attorney if you have a very large estate (say, half a million dollars or more), if you want to make conditional bequests ("$5,000 to my daughter Mary if she renounces motorcycle riding"), or if you have any potential family problems (say, you're uncertain about the existence of illegitimate children, or you've had a foreign and potentially invalid divorce). But if you're an average, middle-class American with a Macintosh and without a will — and you don't live in Louisiana, which has unusual laws that the program can't handle — WillMaker can save you time and money and help ensure that your property goes where you want it to after you die.

— Loftus E. Becker, Jr.

WillMaker
★★★½

WM

List Price: $59.95
Published by: Nolo Press, 950 Parker St., Berkeley, CA 94710-2589; (415) 549-1976.
Version: 3.0
Requires: 800K disk drive and printer; 400K disk version available from publisher.
Compatibility: Mac II friendly; MultiFinder hostile, doesn't refresh windows.
Application Size: 75K (including Run-Time Microsoft Basic, provided).
Copy Protection: None

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	WriteNow 2.0	MacWrite 5.0	MS Write	MS Word 3.01
Spelling checker size	100,000 words	100,000 words	80,000 words	80,000 words
Font size range	4-127 pts.	7-24 pts.	7-72 pts.	2-127 pts.
Maximum recommended document size (in pages)	Over 2,000	240	50	500
Number of open documents	Unlimited *	1	30	30
Mail merge	**Yes**	No	No	Yes
Number of editable, on-screen columns (WYSIWYG)	4	1	1	1
On-screen auto-numbering footnotes	Yes	No	No	No
Automatic repagination	Yes	Yes	No	No
Graphics in same line as text	Yes	No	Yes	Yes
Multiple headers and footers	Yes	No	No	Yes
Extensive Undo	Yes	No	No	No
Variable line spacing (in points)	Yes	No	No	Yes
Selective font, size, style, and ruler changes	Yes	No	No	Yes
MacUser Magazine's Best New Word Processor	**Yes**	No	No	No
Search for a word	2.4 *sec*	7.6 *sec*	9.5 *sec*	9.7 *sec*
Spell Check document	6.3 *sec*	2 *min* 34.0 *sec*	2 *min* 2.3 *sec*	1 *min* 48.0 *sec*
Copy & Paste large area	6.8 *sec*	1 *min* 0.9 *sec*	12.4 *sec*	12.3 *sec*
Change font size of document	10.7 *sec*	50.2 *sec*	17.6 *sec*	16.2 *sec*
Change font of document	10.8 *sec*	37.1 *sec*	14.1 *sec*	15.2 *sec*
'Save As' a 12-page document	3.6 *sec*	9.4 *sec*	20.3 *sec*	19.6 *sec*
Retail Price	$195	$125	$175	$395
Happy Users	***Yes***	?	?	?

* Number determined by Macintosh system constraints.



...*Happy Users!*



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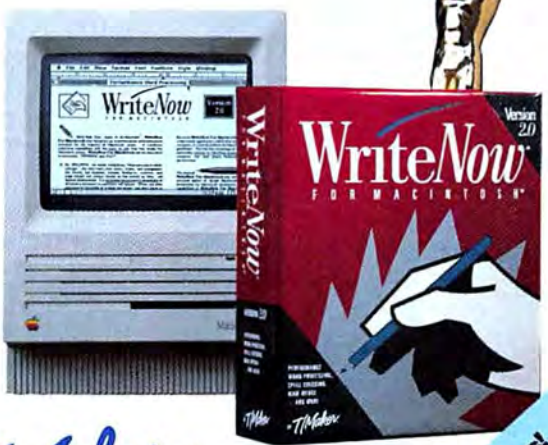
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MacUser



"Although this category, unlike spreadsheets and word processors, had a lot of new players this year, one seemed to us to be the clear leader.
4th Dimension, the powerful first product from ACIUS, takes the kudos."
MacUser, February 1988

"Congratulations! InfoWorld's readers have chosen 4th Dimension as the Product of the Year in the Macintosh Database Systems category."
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Steve Mann, Macintosh Today August 11, 1987

"Users with no experience or interest in programming can build a barebones database in 4D's 'Design Environment' just by pointing, clicking, and naming files and fields."
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David Brandt, MacWEEK, January 19, 1988

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Jan L. Harrington, MacUser, November 1987

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Adam Green, Macworld, July 1987

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Andrew Gore, The Macintosh Buyer's Guide, Spring 1988

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Show and Sell

You have to believe that Apple thinks it has a mighty fine bunch of computers in its Macintosh line. It probably sinks enough money into print and TV advertising to restore the economy of any emerging third world country. It employs a large number of people who presumably do much more than sit around thinking up new system numbers. Why, then, do I walk out of Apple press announcements convinced that the people doing the presentations don't have a clue about what the Mac can do?

When you go to Apple for a press briefing, every Apple person involved walks in with a file folder full of transparencies. You are handed photocopies of what appear to be MORE bullet charts. Then someone takes the original transparencies and projects them on a screen and reads them to the attendees. The level of excitement generated is somewhere between watching grass grow and a coma. Even if you *want* to get excited, you find yourself more involved in just staying awake.



BELINDA MORRISSEY

Case in point: The most recent Apple hardware announcement (as of this writing) was for the Mac IIx. It took place in San Francisco in a very nice auditorium in the opera complex. Randy Battat proudly announced at the beginning that the charts and slides we would be seeing were done in Cricket Presents. You know Cricket Presents; it is notable for — among other things — color. About the only thing you'd learn about it from the Apple presentations is that Cricket Presents does an outstanding job at importing MORE black-and-white bullet charts — which MORE II can do, and it can add color as well, for that matter. Well, let me be perfectly fair. There were two or three tree charts of the Mac product line that were in at least two colors: washed-out red and (if memory serves me) undistinguished green.

Now I could go into a politically correct tirade about how this is what Apple has come to by ignoring (and then actively repudiating) all those T-shirted hacker types whose creativity kept the Mac alive while Apple and third-party companies fumbled around trying to get software for it. But there's a perfectly good "suit" argument in favor of Apple executives and public relations people making full use of their own platform. It's good business. Everyone, both press and users (corporate or otherwise), is interested in a company that's excited about its product. Apple representatives should be up there putting the Mac through its paces — breaking the sound barrier instead of doing a few boring loops. The one thing about the Mac that everyone knows of, even if they're unregenerate PC users, is its graphics ability. Amazing graphics. Mind-boggling graphics. Animated graphics. And with the Mac II, *color* graphics. Let's see some of that from Apple, who should be able to do it best. To a lot of people, MIS directors among them, a computer is just a computer. If your computer does something that distinguishes it from the rest, you ought to be making sure everyone knows it.

If the people who should know the Mac best don't seem to be impressed, why should anyone else?

Comdex in Brief

Speaking of businesses and presentations, I saved myself a little time at the Las Vegas Comdex by avoiding booths manned by scantily dressed models — of either sex — busting out of the tops of their costumes. In this respect, Comdex looks more like the Consumer Electronics Show every year. Maybe in Las Vegas these companies think they have to compete with showgirls and clubs. (No company is crazy enough to think it can compete with the casinos.)

Comdex news included a rash of optical storage media, a welcome side effect of the NeXT announcement. But the thing I heard people discussing most often was the "ghettoizing" of Macintosh products at the next Comdex. At the spring Chicago Comdex, there will also be a MacDEX. This idea might have seemed like a good one about two years ago. Finding the Mac-only vendors was an arduous task when they were few and far between. Many Mac vendors stayed away from the show because of the Mac's low visibility.

Two booths is not an elegant investment even for companies that can afford it.

The problem now is that there are a number of vendors, including key players such as TOPS, Borland, Microsoft, and Ashton-Tate, that produce both Macintosh and PC products. Where do they exhibit? Two booths is not an elegant investment even for companies that can afford it.

And what about a company like Cornerstone, which produces one- and two-page display monitors? About 40 percent of its business is



By Louise Kohl



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In addition to being first to compress sounds, MasterJuggler has an extensive list of exclusive features including the ability to:

- Open applications and documents without returning to the finder
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- Bring to the front any selectable window in the open application via a pop-up menu
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- Display and print name or number conflicts among the available fonts, DA's, FKeys and sounds
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Macintosh: not enough to warrant the cost of two booths, but too much to ignore entirely.

This is an idea whose time has come — and gone. Macs are beginning to have a real corporate presence. More than that, the Macintosh can reach out and touch almost every other kind of computer, from PCs to mainframes. Mac-only and PC-only vendors still exist, but they are rapidly becoming the minority. *MacUser* editors went by few non-Macintosh booths in which someone didn't start talking about plans for a Mac product or connecting to a Mac — including Hewlett-Packard. Mac-only companies and products are not by any means the whole market anymore. People have learned that different computers sometimes have different virtues, and the one-brand office is becoming obsolete.

MacDEX is an idea whose time has come and gone. That it exists at all is clear indication that the promoters are out of touch not only with what's happening in the Mac market but also with the personal computer market as a whole.

The MacDEX decision could make more money for Comdex organizers, but otherwise the idea has little to recommend it. It looks like a clear case of failure to reality-check.



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BOB SCOTT

Mastery versus Diddling Around

Well, excuuuuuuse me.

In the October issue of *MacUser*, I wrote here about what I called "The 'Big Lie' TV Spot." That was the Apple commercial that shows an earnest female manager being interviewed by her manager, who is unhappy about the company's rising personal-computer training costs. One of the company's offices doesn't have that problem, he says. Yeah, she replies: They have a different kind of computer system there. And the people seem to be able to train *themselves*. I said that spot was a big lie, because to deny the existence of training costs is deceptive and shortsighted.

Introducing any new system to an office setting always has associated training costs, and denying those costs doesn't make them go away. You can *reduce* your training costs, but you're fooling yourself if you think you'll eliminate them.

I got a lot of nice letters from businesspeople who'd found from their own experience that this is how it works. Even with Macs, where the relative program-to-program consistency of the interface means there can be some economies — the old "once you know how to use one program, you'll know how to use them all" routine is an overstatement but is built around a kernel of truth — there are substantial startup training costs and continuing, in-service training costs.

But I also got another basketful of angry letters from Mac lovers who thought I had fouled my nest with that kind of nonsense. How could I be such a traitor to the Mac cause? Did I really think anyone needed anything so mundane as training on a Mac?

And at Comdex in Las Vegas the next month, what seemed like most of the Mac-using community who hadn't written to me came up to tell me in person how far off-base I was. No one they knew needed any training on the Macintosh. Which is, I think, a good part of my point. The world isn't full of people who are, like you and me, Mac zealots, Mac fanatics, Mac junkies.

The world is, however, full of perfectly sound people who, given an opportunity to make an informed choice between using a Macintosh and using another kind of computer for most office work, would choose the Mac — if they could then count on getting some help in learning how to use it. And really learning how to use a computer — which in this case means learning how to use a software package, or two, or three — isn't just a matter of picking up the basics and then plodding along, but rather a matter of learning how to use it *well*.

Which is the second big issue here, and the point at which training can make all the difference in a corporate setting. Granted, most of us can pick up the basics of Mac use by ourselves. The training materials Apple packs in the box with the Mac aren't very good, of course, but mercifully they don't need to be very good, because the basics of using the machine are pretty easily grasped.

For a lot of us, who came to the Mac in the days when the software choices were principally MacWrite and MacPaint, the learning curve is today a lot steeper, so we tend to underestimate how much work is involved. But that's another column.

Introducing any new system to an office setting always has associated training costs.

Yes, Master

The issue of *mastery*, as opposed to low-level or occasional use of a program, is so important that I wanted to revisit the Mac-training wars once again, despite the nasty letters I know I'll get. I can't tell you how many hundreds of times I've settled in next to a Mac user in a large corporation, listened to what he or she liked and disliked about the machine, and watched him or her at work on the Mac for a while. And in the process, I've seen some incredibly clumsy ways of getting things done.

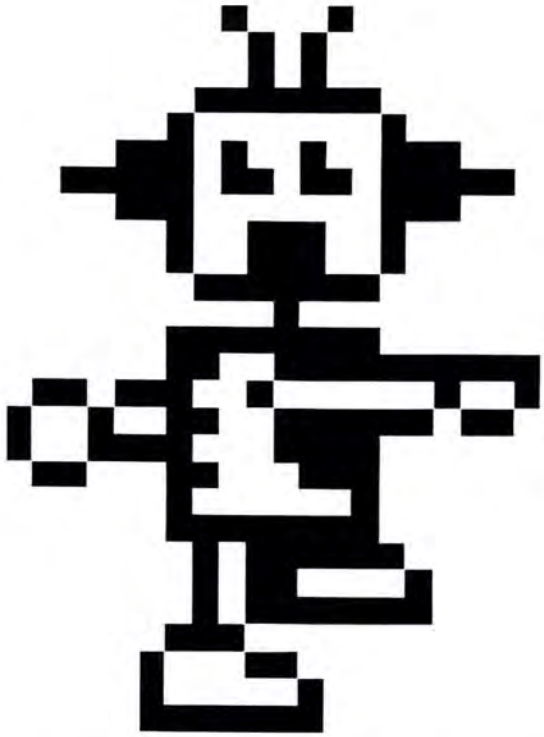
Much of the power of the Mac is in the keyboard shortcuts hidden in the mainstream Mac programs. And another part of the power of the Mac resides in little



By Jim Seymour

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tricks buried in the System/Finder duo. Together, these libraries of shortcuts don't just define the difference between a power user and a duffer; they make the difference between a satisfied user and someone who still isn't sure it's all worth it. I've learned that when I see people taking these roundabout ways to get things done in Excel and Word and FileMaker and MacDraw and so on, I should bite my tongue before speaking: Not everyone *wants* to be a power user. But almost all of us want to

Not everyone wants to be a power user, but we all want to know some tricks.

know a few little tricks to help us get through our work more quickly and easily. And so I almost always do speak up, passing along little Option-this, Control-that tips that accelerate the work and make it less burdensome.

People invariably love those little tips — things you and I would find perfectly obvious — and often come up to me months later and tell me what a difference they've made. That's one of the great benefits of real training: good, results-oriented, applications-focused training lets people pick up the stuff they need but will never find in a manual.

Remember that part of the equation with an easy-to-use computer such as the Mac is that there's an even greater disincentive than usual never to open those manuals. So if you're among those who wrote a couple of months ago to complain that I didn't understand how easy the Mac was to use — or just one of those who muttered and turned the page — think again about whether all this "pick it up on your own" stuff is really the best way to learn to use a Mac. Or is it simply the way *you* learned? And, in retrospect, wouldn't you have preferred a little jump-start help along the way?

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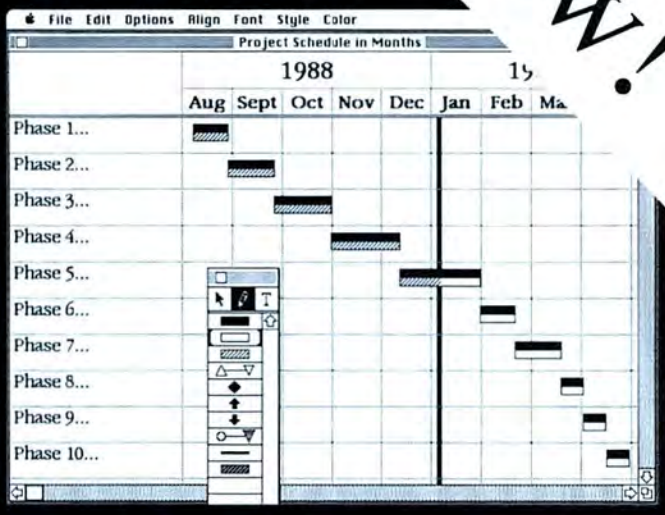
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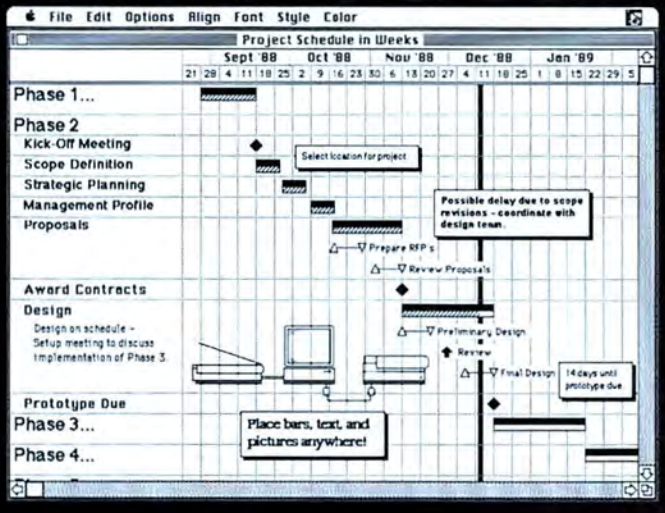
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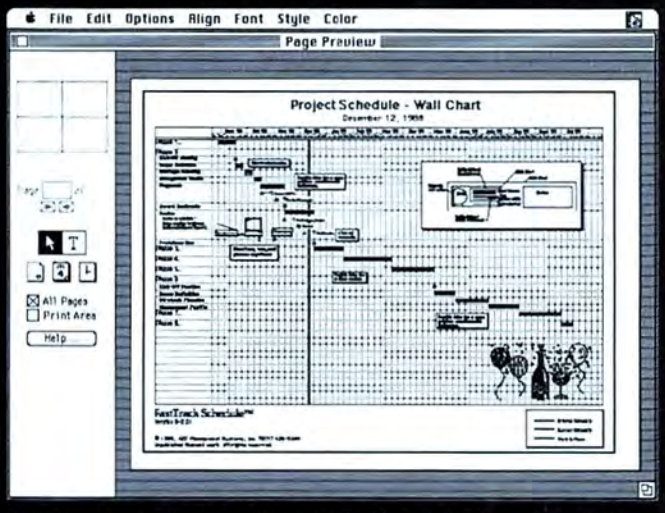
This...



or this...



or even this... *FAST!*



System requirements: Macintosh Plus or better. Supports COLOR display with a Mac II and a COLOR monitor, and COLOR output with an ImageWriter II or LQ.



DAVE JOLY

An Ounce of Prevention

The media coverage of computer viruses has a lot in common with the media coverage of AIDS. It is sensationalized and overblown, pandering to the fears of the general public, and it is appallingly lacking in substance and basic facts. As a result, computer users often react with the same kind of hysteria that accompanied the beginnings of the AIDS epidemic. Thanks to the diligence of many organizations in the fight against AIDS, the public is much better informed now about AIDS, and the hysteria level has dropped considerably. The same sort of education is needed on the subject of computer viruses to calm the mounting panic.

Computer tampering has been around almost as long as computers themselves. In business computing in the past, the culprit was usually a disgruntled employee who somehow attacked the system and its programs. Now, in the age of telecommunications and networking, many more people have the ability to attempt to "get" a company's computers. You can't protect yourself absolutely, but you can take steps to minimize your exposure and to soften the impact if someone does succeed in attacking your company's system, either deliberately or accidentally. Here are some recommended precautions.

Education: As NBC's "Saturday Night Live" put it, "Remember that when you connect to another computer, you are connecting to every computer that it has connected to." This was meant humorously, but it happens to be true nonetheless. If your company is networked, you are only as safe as the weakest link in the chain. You need to educate everyone about the dangers and have everyone participate in the safeguards.

Screen Employees: Most computer tampering and almost all computer crime is traced to someone on the inside. You need to have a lot of faith in your employees, so choose them well. Before computers, a malicious employee could cause minor damage and perhaps cost you a customer or two. Now, if your business is highly computerized, a misguided employee can destroy your business. So choose carefully the people you are trusting with your company's precious data.

Safe Software: While there's no such thing as a sure thing, your best bet for avoiding software viruses is to use only commercial software that you have acquired through normal distribution channels. A shrink-wrapped copy of Excel bought at a major computer store is vastly less likely to be virus infested than a copy "borrowed" from someone or purchased second-hand. If you're going to download software, get it from a commercial service or BBS that you know checks its submissions, and be discriminating. As one of the sysops of MAUG on CompuServe, I have seen many messages from people saying things like, "I downloaded this INIT and installed it, but what does it do?" Needless to say, it is not very smart to install software on your machine if you don't know what it does.

Protection: For a little extra safety, acquire and use programs such as Vaccine, from CE Software, and Interferon, written by Robert Woodhead. Vaccine constantly monitors your system for suspicious behavior and warns you if a program is about to do something irregular, allowing you to stop it. Interferon performs after-the-fact checking, scanning your disks for evidence of known viruses and other tampering. These programs don't offer absolute protection, but some protection is better than none.

Backup: If you're using your Mac for business, you should already know the importance of performing regular backups. For protection from viruses and other tampering, you may want to perform generational backup, making new backups instead of reusing the same media. It's more expensive, but there may come a time when you have to go back days or weeks to retrieve an unaffected copy of a file.

You should also take special care of your backups, locking them up for safety and storing some of them off-site. Remember, someone on the inside could destroy the backups if they're left out in the open.

It's also a good idea to keep a separate backup of your System folder in a pristine state. Besides viruses and tampering, there are many problems that can damage System files, and restoring your System folder will sometimes stop recurring system bombs.

Never Cry Wolf: If you do suddenly start experiencing prob-

Your best bet for avoiding software viruses is to use only commercial software that you have acquired through normal distribution channels.



BY ROBERT R. WIGGINS

Programs & Peripherals

Networking Software & Hardware

CE Software Quick Mail	165.	**Shiva** NetModem V1200	359.
Farrallon PhoneNET AppleTalk	9.	NetModem V2400	479.
PhoneNET Din 8 or DB9	35.	**SuperMac Software** Acknowledge	349.
Timbuktu	65.	Multi-User SuperLaserSpool	199.
TrafficWatch	149.	**Symantec** InBox-MacConnection	75.
Infosphere		InBox-Starter Kit V2.0	
MacServe *(Network Software)*	155.	*(3 Personal Connections)*	199.
LaCie Silverserver	92.	**TOPS**	
Microsoft		Tops 2.0, Tops Dos or Net Print	119.
Microsoft Mail 1-4 users	195.	Tops Repeater or Flashbox	129.
Olduvai Software Clip Share	109.	Tops FlashCard	169.
Font Sharer	149.	Tops Teleconnector Din8 or DB9	39.

Desk Accessory Programs

Affinity Microsystems Tempo II	89.	**Imagine Software**	
AffiniFile	46.	Smart Alarms & Appointment Diary	35.
Beyond Inc. Menu Fonts 2	30.	**Mainstay**	
Borland SideKick V2.0	65.	Think'n Time	61.
Cassady & Greene, Inc.		**Olduvai Software**	
HyperDialer	26.	DA Switcher	25.
QuickDex 1.4A	32.	**Solutions, International**	
CE Software DiskTop 3.0	27.	Super Glue	52.
Deneba Software		SmartScrap & The Clipper V2.0	46.
Comment 2.0	54.	**Symmetry**	
Electronic Arts Disk Tools Plus	31.	HyperDA *(Req. 512K)*	38.
Exodus Software Retriever	59.	**TENpointO** OpenIt!	59.

MAC-101 Keyboard by DataDesk



If you are looking to replace your Mac's keyboard, the ***MAC-101*** by DataDesk is the way to go. It comes in an ADB version for the Mac SE and II, and a non-ADB version for the Mac 512 and MacPlus. The positive tactile, firm feel 101 includes a full numeric keypad, 15 function keys, 6 page control keys, and a T-style cursor pad. Keyboard status indicator lights let you know when everything is going smoothly. Includes *101-Keys* desk accessory software, a powerful macro utility which allows you to exploit the full power of the function keys with almost any Macintosh application.

MAC-101 Keyboard *(Specify ADB or non-ADB)*..... **145.**

Communications Software

Compuserve		**Insigna** SoftPC	479.
Compuserve Starter Kit	24.	**Software Ventures**	
Grolier On Line Encyclopedia	32.	Microphone II *(Includes Glue)*	225.
Compuserve Navigator	45.	**Solutions, International**	
DataViz MacLink Plus with Cable	145.	BackFax	129.
Dow Jones		**Synergy Software**	
Desktop Express	95.	VersaTerm	69.
Freesoft Red Ryder V10.3	54.	VersaTerm-Pro	195.
Hayes Smartcom II 3.0	88.	**Traveling Software** LAP-LINK	84.

Word Processors & Desktop Publishing

Access Technology Mind Write 2.0	95.	**Microsoft** Microsoft Word 4.0	255.
Mind Write Express	149.	**Postcraft International, Inc.**	
Allan Bonadio Associates		Laser Fx Font Packs 1-6 ea.	29.
Expressionist 2.0	79.	Laser Fx	114.
Aldus Corporation		**Quark, Inc.** QuarkXPress V2.0	499.
PageMaker 3.0	399.	**Silicon Beach Software**	
Ashton Tate		Silicon Press	41.
FullWrite Professional	269.	**Symantec** More II	Call
Broderbund DTP Advisor	47.	**Symmetry** Acta V2.0	46.
Caere Omnipage	569.	Acta Advantage	69.
Claris MacWrite 5.0	105.	**T/Maker Company**	
Letraset		WriteNow V2.0	109.
Ready, Set, Go! 4.5	279.	**Word Perfect Corporation**	
Letra Studio	369.	Word Perfect	185.
LetraFonts *(Various Vol. 1-45 ea.)*	69.	**Working Software** QuickLetter	79.

MacKids Educational Programs by Nordic Software



MacKids is a complete series of twelve quality educational software products for the Mac specifically designed to teach and entertain kids. Whether your children are preschoolers or young adults, there's a *MacKids* package that will give them the learning edge.

Preschool Disk 1 (3-7), Preschool Disk 2 (3-7), CoinWorks (4-12), ClockWorks (4-10), Early Elementary 1 (6-9), Lemonade Stand (6-16), FlashWorks (6-adult), Naval Battle (6-adult), Word Search (6-adult), Alphabetizer (7-adult), EarthWorks (10-adult), or BodyWorks (10-adult).

Each Program ..... **28.**

Spelling & Grammar Checkers

Aegis Development		**Electronic Arts** Thunder! 1.23	30.
Doug Clapp's Word Tools 2nd Edition	42.	**Lundeen & Associates** WorksPlus Spell 1.1	46.
A.L.P. Systems MacProof 3.0	115.	**Microlytics, Inc.**	
Deneba Software Spelling Coach 3.0		Word Finder *(Synonym Finder)*	33.
(Webster's/Medical/Legal/Hyphenation)	54.	**Sensible Software** Sensible Grammar	54.
Coach Merriam Webster's Thesaurus 2.0	35.	**Working Software** Spellswell 2.0	45.
Spelling Coach 3.0 Professional	105.	Lookup *(Makes Spelling Suggestions)*	30.

Accounting Packages

Aatrix Software Aatrix TimeMinder	109.	Insight Expert GL, AR, or AP	455.
Aatrix Payroll Plus	159.	**MECA** Managing Your Money	128.
Bedford Software Simply Accounting	219.	**Monogram** Business Sense	279.
Chang Labs		Dollars & Sense 4.0	81.
New Enhanced Version III Modules!		**North Edge Software** Timeslips III	117.
Rags to Riches Gen. 3-Pak		**Peachtree** Back To Basics Professional	
(GL/AR/AP)	289.	*(GL/AR/AP/INV)*	159.
Rags to Riches GL, AR, or AP	120.	**Softview** Taxview Planner	65.
Dac Software Dac-Easy Light	45.	California or New York Supplements	39.
Intuit Quicken	***Special*** 33.	MacinTax Federal	69.
Layered Insight One Write	185.	**Survivor Software** MacMoney 3.0 *(En. Ver.)*	62.

Macinware SE Ext. Carrying Case by I/O Design

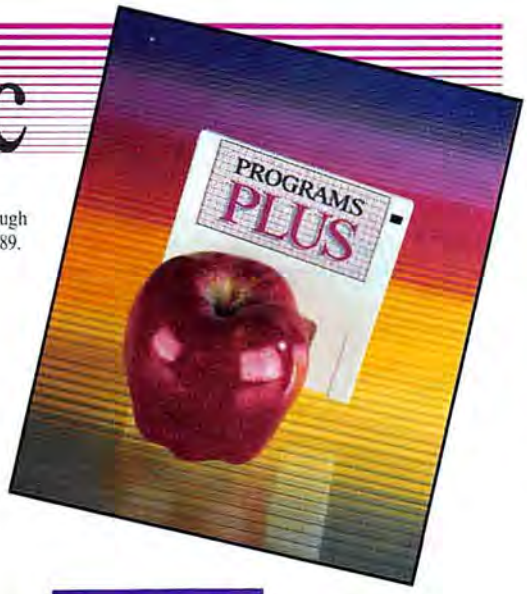


The ***Macinware SE Ext. Carrying Case*** protects your Mac SE, Plus, or 512K and its extended keyboard in safety and style. It's made of rugged 1000 Denier Dupont Cordura nylon, and surrounds your machine with a full half-inch of high-density foam padding. There's room for an external hard drive, a mouse, cords, and disks, so your complete system travels with you in one compact unit. All stress points are cross-box stitched for added safety. A convenient shoulder strap is included, and you can choose platinum grey or navy blue colors.

SE Carrying Case..... **75.**

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Game Software

Access World Class Leader Board Golf	34.
Accolade Hard Ball or Mean 18	23.
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Activision Shanghai or Jinxter	24.
Corruption	27.
Universal Military Simulator or Manhole	30.
Might and Magic	36.
Sky Travel	45.
Artworx Bridge 5.0	22.
Avalon Hill Mac Pro Football	28.
Broderbund Ancient Art of War or At Sea	27.
ShufflePuck Cafe or Ultima III	24.
Poster Maker Plus	36.
Bullseye Software	
P51 Mustang or Ferrari Grand Prix	32.
Cassady & Greene, Inc. Crystal Quest	26.
Crystal Quest w/Critter Editor	42.
Centron Crapsmaster, Roulettemaster or BlackJack Ace	27.
Discovery Software Arknoid	27.
Electronic Arts ChessMaster 2000	28.
Chuck Yeager Flight Simulator or Life & Death	32.
Starfleet I	37.
Scrabble	26.
One-On-One, Pinball Construction Set, Seven Cities of Gold, SkyFox, or Patton vs Rommel	15.
EPYX Sub Battle Simulator *(Mac or MacII)*	29.
Hayden Software Sargon IV	29.
Infinity Software, LTD.	
Go or GrandSlam Tennis	27.
Infocom Leather Goddesses of Phobos or Hitchhiker's Guide	15.
Beyond Zork, Zork Trilogy or QuaterStaff	30.
Zork Zero	36.
Microsoft Flight Simulator 1.02	32.
Micro Sports MSFL Pro Draft	26.
MSFL Pro League Football or 500 Great Teams	32.
Miles Computing Inc. Down Hill Racer	24.
Harrier Strike Mission II or The Fool's Errand	27.
Mindscape Balance of Power 1990, Crossword Magic or Citadel	30.
Deja Vu: A Nightmare Comes True	30.
King Of Chicago, Shadowgate or Joker Poker	30.
Defender of the Crown, Colony or The Uninvited	30.
Practical Computer Applications	
MacGolf or Lunar Rescue	35.
MacCourses	32.
Road Racer	41.
Mac Golf Classics	54.
Primera Smash Hit Racquetball II	21.
Sierra On-Line Leisure Suit Larry	23.
Space Quest or Space Quest II	29.
Police Quest	29.
Silicon Beach Software	
Dark Castle or Apache Strike	27.
Beyond Dark Castle	27.
Sir-Tech Mac Wizardry	35.
SoftStream, Inc. Colour Billiards	35.
Mac Man or Solitaire DA	24.
Sphere, Inc. Tetris	20.
GATO, Orbiter or Pt-109	26.
Solitaire Royale *(Mac or MacII)*	20.
Falcon 2.0	32.
Studio Zero Orbital Mech	29.
XOR Software NFL Challenge	59.
Pro Challenge or Basketball Challenge	29.

SuperSpool, SuperLaserSpool, DiskFit & Sentinel by SuperMac Software



Sooner or later you'll find that you have to spool-up, back-up or lock-up your data and it's a safe bet that *SuperMac* has just the programs you'll be looking for. ***SuperSpool*** and ***SuperLaserSpool*** return control of your Mac to YOU while your printer is busy printing. ***DiskFit*** is a utility that let's you quickly backup your hard disk to floppies keeping your data protected from electronic tribulations. And, ***Sentinel*** allows you to lock up your private documents by encrypting the data, keeping it safe from prying eyes!

SuperSpool 5.0 ..... **54.**
SuperLaserSpool 2.0 ..... **82.**
Diskfit 1.4 ..... **54.**
Sentinel 2.0 ..... **155.**

Modems

Abaton InterFax 12/48	329.
Anchor Automation	
MacPac 2400E w/software & cable	179.
Epic	
Epic 2400 Int. SE	315.
Epic 2400 Int. Mac II	315.
Epic 2400 Mini Ext. *(Hayes Compatible)*	179.
Everex Emac 2400 Baud	225.
Hayes Microcomputing	
Smartmodem 1200	299.
Smartmodem 2400	449.
MDIdeas Commlink 2400	189.
Migent	
Migent Pocket Modem *(ext. 300/1200 Baud)*	115.
Novation Novation Parrot 1200	109.
Practical Peripherals	
Practical Modem Mini 1200SA	79.
Practical Modem 1200SA	109.
Practical Modem 2400SA	181.
MacCommpack *(2400SA w/Microphone II & Cable)*	229.
Prometheus	
Promodem 2400M Ext. *(Software & Cable)*	199.
Promodem 2400 *(Hayes Compatible)*	255.
Supra Corporation Supra Modem 2400	149.
U.S. Robotics	
Courier 1200 *(Hayes Compatible)*	199.
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Utility Software

ALSoft Disk Express 35.
Font/DA Juggler Plus 42.
Berkeley System Design
Stepping Out II *Special* 52.
CE Software
QuicKeys *(Macro Program)* 53.
Central Point Software Copy II Mac *(Includes MacTools)* 20.
PC Tools Deluxe Mac 45.
Emerald City Software LaserTalk 187.
Fifth Generation Systems Suitcase II 44.
FastBack For The Macintosh 54.
Power Station 32.
HJC Virex 69.
Icom Simulations On Cue 36.
TMON 89.
Infosphere Liaison 179.
Microlytics, Inc. GOfer 44.
Microseeds Redux 65.
ScreenGems 49.
Olduvai Software
Icon-It! or MultiClip 39.
Read-It! TS *(For Thunderscan)* 79.
Read-It! O.C.R. 2.0 *(For Image Scanners)* 199.
PCPC HFS Back-Up 3.0 54.
Softworks
Stack Cleaner 29.
HyperTools 1 or 2 59.
SuperMac Software
SuperSpool 5.0 *Special* 54.
SuperLaserSpool 2.0 *Special* 82.
Diskfit 1.4 *Special* 54.
Sentinel 2.0 *Special* 155.
Symantec MacSQZ! 49.
Symantec Utilities for Mac *(S.U.M.)* 59.
Williams & Macias
myDiskLabeler w/Color 31.
myDiskLabeler w/LaserWriter Option 34.
Working Software
Findswell 2.0 *(Document Finder)* 36.

Printers & Digitizers

Digital Vision
Computer Eyes-Mac 209.
Koala Technologies Corp.
MacVision 2.0 *(Digitizer)* 219.
Kurta IS ADB Tablet 255.
Cordless 4 Button Cursor 95.
Seikosha
SP1000 *(Imagewriter Comp.)* 235.
Summagraphics Bit Pad Plus 329.
ThunderWare
ThunderScan V4.0 with Power Port 199.
Mac II Power Accessory 42.

Stepping Out II by Berkeley System Design, Inc.



Stepping Out II is a program designed to expand the capabilities of any standard Macintosh display to give it the same feel and features as a full page display. Now you can choose the screen size which is most comfortable for you. Working with large spreadsheets and full page layouts becomes easy since you are no longer limited by small windows and slow scrolling. For detail work on small areas you can enlarge any portion of the big screen up to sixteen times. Handy features and ease of use makes *Stepping Out II* the ultimate viewing tool for any Mac.

Stepping Out II ..... **52.**

Disk Drives/Hard Disks/Upgrades

Applied Engineering MacRAMS *(1 MB SIMMS Mac+, SE, II)* 489.
AST Research
Mac286 Co-Processor *(Mac II)* Call
CMS
Compact Series SC30 *(Mac+/SE/II)* 649.
Compact Series SC45 *(Mac+/SE/II)* 859.
SD Series MacStack SD20 *(Mac+/SE/II)* 569.
SD Series MacStack SD60 *(Mac+/SE/II)* 849.
Cutting Edge
Cutting Edge 800k Drive *Special* 175.
Cutting Edge Wedge XL 30 Plus SCSI Hard Drive 629.
Cutting Edge Wedge XL 45 Plus SCSI Hard Drive 829.
Cutting Edge XL 30 Internal Hard Drive 505.
Cutting Edge XL 45 Internal Hard Drive 645.
Dove Computer Corporation
Marathon 020 Accelerator
MSE 1 (16 Mhz) 585.
MSE 2 (16 Mhz w/1MB) 979.
MSE 3 (16 Mhz w/Math Co-processor) 779.
MSE 4 (16 Mhz w/1MB & Math Chip) 1159.
MacSnap 524 *(512K to 1MB)* 315.
MacSnap 524E *(512E to 1MB)* 289.
MacSnap 524S *(512E to 1MB w/SCSI)* 379.
MacSnap 548 *(512K to 2MB)* 459.
MacSnap 548E *(512E to 2MB)* 549.
MacSnap 548S *(512E to 2MB w/SCSI)* 599.
MacSnap Plus 2 *(MacPlus to 2MB Non Expandable)* 439.
MacSnap 2SE or 1024 Option *(1MB or MacII Memory Exp.)* 439.
SCSI Interface/Port 109.
MacSnap Toolkit *(torx driver, opener & grounding set)* 15.
Everex
Emac 20D *(20Mg Hard Disk)* 520.
Emac 20 Deluxe 585.
Personal Computer Peripherals
Beige or Platinum Color. Optional Built-In Modems Available.
MacBottom HD-21 *(20+MB SCSI Hard Disk)* 659.
MacBottom HD-32 *(32MB SCSI HD)* 699.
MacBottom HD-45 *(45MB SCSI HD)* 859.
MacBottom HD-70 *(70MB SCSI Hard Disk) Plat only* 999.
Rodime Rodime 20 Plus Ext. 629.
Rodime 45 Plus *(Ext. 45MB SCSI)* 939.
Rodime 450RX *(Int. 45MB Mac SE/II)* 829.
Rodime 100 Plus *(Ext. 100MB SCSI)* 1169.
Rodime 140 Plus *(Ext. 140MB SCSI)* 1319.
Rodime 1000 RX *(Int. 100MB MacII)* 1045.
Video Technology
Laser 800k External Drive 185.

Quicken by Intuit



Quicken is the fastest, easiest way to cut through personal and small business paper work. In minutes you'll get a handle on your finances without having to bother with any of the burdensome terminology and repetitive entry that most accounting packages require. *Quicken* is flexible; it lets you enter an unlimited number of transactions, expense and income categories, and checking accounts. *Quicken* lets you write checks, make and track budgets, manage cash flow, and even reconcile unbalanced accounts. Now *Quicken* links directly with MacinTax to save you even more time at tax time!

Quicken ..... **33.**

DataBase Management

Acius 4th Dimension 489.
4D Runtime 239.
Activision Reports for Hypercard 75.
Focal Point & Business Class Bundle 65.
City To City 30.
Apple Computer HyperCard 42.
Ashton Tate dBASE Mac 1.0 295.
Blythe Software Omnis 3 Plus/*Express* 129.
Borland Reflex Plus 165.
Claris FileMaker II 239.
Fox Software Fox Base Plus 208.
Microsoft Microsoft File 2.0 120.
Nordic HyperCONTROL 42.
Odesta Double Helix II 339.
DataDesk Professional 289.
GeoQuery 199.
Software Discoveries RecordHolderPlus 45.
TENpointO FocalPoint II 125.

Educational/Creative Software

Ars Nova Practica Musica 79.
Barron's Barron's SAT 35.
Bible Research The Word (KJV or NIV) 165.
Bogas Productions Studio Session 49.
String Quartet, Country or Heavy Metal 15.
Super Studio Session 79.
Bright Star Technology Alphabet Blocks 32.
Talking Tiles 69.
Broderbund Clip Sounds 36.
Jam Session or Black & White Movies 30.
Sensei Geometry, Calculus or Physics 59.
Type! 20.
Where in the World is Carmen SanDiego? 27.
Coda Mac Drums 32.
Perceive 65.
Davidson & Associates
Speed Reader II 39.
Math Blaster or Word Attack! 27.
Electronic Arts Mavis Beacon Typing 36.
Venture's Business Simulator 47.
Deluxe Music Construction Set V2.5 85.
1st Byte/Electronic Arts Kid Talk, Speller Bee, First Shapes, or Math Talk 32.
Great Wave Software KidsTime 26.
Number Maze 27.
Crystal Paint 27.
Individual Typing Instructor Encore 26.
Learning Company Reader Rabbit 33.
Mindscape Perfect Score SAT w/The Perfect College 46.
Niles & Associates End Note 82.
Nordic
MacKids Educational Prog. *(ea)* *Special* 28.
Simon & Schuster Typing Tutor IV 35.
Springboard Top Honors 59.
Family Matters or Atlas Explorer 28.

Studio/8 by Electronic Arts



Professional artists and amateurs alike will enjoy the power that ***Studio/8*** reveals in the Mac II. *Studio/8* is the first full-color, full-feature user friendly paint program designed specifically for artists. It features versatile airbrush, paintbrush, icon-based drawing tools, and color routines that you can customize. You'll be rid of hassles with custom typesetting because *Studio/8* supports full text-editing features in the same text box and allows you to dynamically resize and redefine blocks of type, plus shear, rotate, and skew text. *Studio/8* comes bundled with on-line help, a slide show program with built-in production features, a free font disk, and a library of backgrounds and textures.

Studio/8 ..... **319.**

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Business Software

Abacus Concepts
StatView II
(Mac+, SE, II w/68020 & 68881) 349.
StatView SE+ Graphics 229.
Access Technology Trapeze 2.1 159.
Ashton Tate Full Impact 249.
Borland Eureka! The Solver 129.
BrainPower ArchiText 182.
StatView 512 Plus 175.
Math View Professional 144.
DataScan 118.
Bravo Technologies MacCalc 79.
Chang Laboratories
C.A.T. Contacts•Activities•Time 229.
Claris MacProject II 395.
Cognition Technology MacSMARTS 135.
D2 Software MacSpin 2.0 189.
Individual 101 Macros For Excel 37.
Legisoft WillMaker 3.0 34.
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WorksPlus Commands 59.
Mainstay
Capture 42.
Mac Flow 2.0 or Mac Schedule 115.
Meta Software MetaDesign 199.
Micro Planning Software
Micro Planner 6.0 325.
Microsoft Microsoft Works 2.0 189.
Microsoft Excel 1.5 255.
Satori Software
Bulk Mailer 3.2 79.
Bulk Mailer Plus 195.
Components GL 389.
Select Micro Systems, Inc.
Exstatix or MapMaker 219.
Shana Corporation
Fast Forms 89.
Softworks Client 129.
Synex Mac Envelope 4.0 59.
Mac Invoice 32.
Systat Systat 3.2
(Specify MacPlus, SE or Mac II) 459.

Cutting Edge 800K External Drive by Cutting Edge



The ***Cutting Edge 800K External Disk Drive*** is the solution for Mac owners who are tired of swapping disks when using large programs or files. This external drive does everything that Apple's does, at a much more reasonable price. It's fully compatible with the Mac 512KE, MacPlus, SE, and II. Use of the drive is exactly the same as for the internal drive you already own, so there are no new keyboard commands or other tricks to learn. Increase your computing efficiency economically with the *Cutting Edge 800K External Disk Drive* today!

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Images With Impact Business 1 75.
ABA Software Draw It Again Sam 2.0 79.
Graphist Paint II 289.
Adobe Systems Adobe Illustrator *88* 319.
Adobe Fonts *(Various volumes)* Call
Aldus Freehand 349.
Altsys Corp. FONTastic Plus 2.0 54.
Fontographer 2.2 239.
Ashton Tate Full Paint 69.
Broderbund Print Shop or Clip Charts 36.
Drawing Tables 79.
CE Software Calendar Maker 3.1 27.
Claris MacPaint II 105.
MacDraw II 309.
Cricket Software Cricket Draw 169.
Cricket Paint or Pictograph 99.
Cricket Graph 119.
Cricket Presents 289.
Deneba Software Canvas DA 1.0 56.
Canvas 2.0 *(Includes Desk Accessory)* 169.
Dream Maker
MacGallery *(Hypercard or Paint)* 28.
Cliptures 97.
Dubl-Click Software
World Class Fonts: Various Vol. 1-6 *(ea)* 45.
WetPaint: Various Vol. 1-16 *(ea)* 45.
Electronic Arts
Studio 8 *(MacII)* ***Special*** 319.
Enzan-Hoshigumi USA
MacCalligraphy 2.0 105.
Japanese Clip Art Call
Foundation Publishing Comic People 25.
Comic Strip Factory 44.
Generic Software Generic CADD 54.
Graphsoft Mini Cad 4.0 375.
Innovative Data Design Dreams 279.
MacDraft 1.2B 149.
Laserware Laserpaint Color II 359.
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Videoworks II Accelerator 118.
Videoworks II Driver for Hypercard 60.
Micro Illusions
Photon Paint 179.
Micro CAD/CAM MGMStation 685.
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MacAtlas Paint 2.0 *(MacPaint Format)* 45.
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The Curator *(Catalog Your Art)* 79.
Springboard Certificate Maker 24.
Works of Art Assortment,
Holiday, or Education 28.
Works of Art Laser Art or Fonts 59.
Springboard Publisher 109.
SuperMac Software Pixel Paint 209.
Symmetry
Picture Base & Wet Paint Bundle 95.
T/Maker Click Art Letters I, Letters II,
Personal Graphics, Effects,
Business Image, or Holidays *(each)* 28.
Christian Images 35.
Click Art EPS Illustrations 75.
Zedcor DeskPaint 2.0 69.

Accessories

Abaton ProPoint *(ADB Mouse for Mac SE & Mac II)* 89.
Asher Engineering
Turbo Trackball *(Mac & Mac+ or Mac SE & Mac II)* 69.
CH Products Mirage: Quad or ADB
(Turns Joystick Into Mouse) 39.
Mach IV Plus: Quad or ADB 65.
Curtis Manufacturing
Emerald-Surge Suppressor-SP-2 36.
Ruby-Surge Suppressor-SPF-2 55.
Cutting Edge Cutting Edge MCK-105QK
Keyboard w/Quickeys 149.
DataDesk
MAC-101 Keyboard/Beige
(128k/512k & MacPlus) ***Special*** 145.
MAC-101 ADB Keyboard/Platinum
(Mac SE & Mac II) ***Special*** 145.
Ergotron Mousecleaner 360° 15.
MacTilt *(Mac, SE or II)* 68.
Farallon
MacRecorder Sound System
(Mac SE or Mac II) 139.
Impulse Audio Digitizer w/soundware 145.
I/O Design *Mac Luggage in Navy*
Macinware Plus Carrying Case 64.
Macinware SE Carrying Case ***Special*** 75.
Imageware II Carrying Case 49.
HDware 54.
Kalmar Designs
Teakwood Roll-Top Disk Cases:
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Double Micro Cabinet *(holds 90 disks)* 21.
Triple Micro Cabinet *(holds 135 disks)* 31.
Kensington External Disk Drive Cover 8.
Extra Long ADB Keyboard Cable 25.
Macintosh II Stand 20.
Macintosh II Monitor Extension Cable 33.
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Mouseway *(Mousepad)* 8.
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Macintosh Plus/SE Dust Cover 9.
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Disk Drive Cleaning Kit 20.
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Modem/Fax Protector 20 25.
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(10, 20, or 50) Call
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Printer Muffler 80 43.
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Super Base 34.
System Saver SE 55.
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Mobius
Fanny Mac QT *(Beige or Platinum)* 60.
Mouse Systems
A+ Mouse *(MacPlus)* 65.
A+ ADB Mouse *(Mac SE/Mac II)* 85.
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Orange Micro Grappler Spooler 39.
Grappler C/Mac/GS 79.
Grappler L/Q or Grappler L/S 92.
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Silicon Comforts MacChimney
(Very Effective Cardboard Laminate Convection Cooling Device) 16.
Smith & Bellows
Mahogany Disk Case *(holds 96)* 30.
Sopris Softworks
High Trek Carry Cases - Platinum Gray, Navy
Imagewriter II Case 49.
Macintosh Plus, SE w/Standard Kybd 59.
Macintosh SE & Extended Kybd Case 69.
Targus Imagewriter II Carry Case Blk. 49.
Macintosh Plus Carry Case Blk. 59.
Deluxe MacPlus-XKB Blk. 69.

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Sony 3½" SS/DD Disks *(box of 10)* 13.
Double Sided 3½" Diskettes
Bulk *(Sony)* 3½" DS/DD *(10)* 17.
Centech 3½" DS/DD Color Disks *(10)* 19.
Sony 3½" DS/DD Disks *(box of 10)* 19.
Fuji 3½" DS/DD Disks *(box of 10)* 19.
Maxell 3½" DS/DD Disks *(box of 10)* 20.
Verbatim 3½" DS/DD Disks *(box of 10)* 19.
3M 3½" DS/DD Disks *(box of 10)* 20.

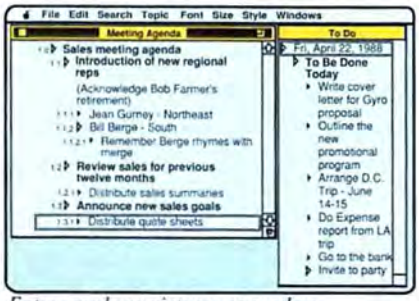
Languages

Borland Turbo Pascal 65.
Turbo Pascal Tutor 46.
Consulair Mac 68000 Dev. System 59.
Mainstay V.I.P. 2.5
(Visual Interactive Programming) 109.
Manx Aztec C 65.
Aztec MPW C 99.
Axtec C + SDB 99.
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Symantec Lightspeed C 95.
Lightspeed Pascal 65.
T.M.L.
TML Pascal II *(Includes MPW)* 79.
TML Source Code Library II 42.
Zedcore ZBasic 5.0 105.

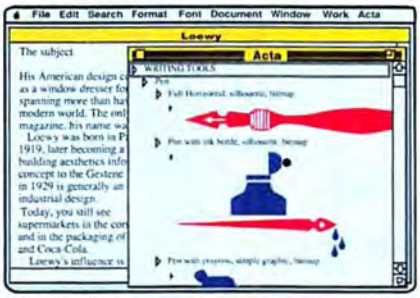
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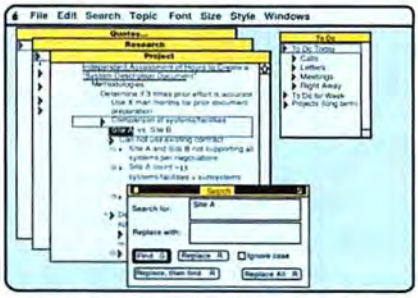
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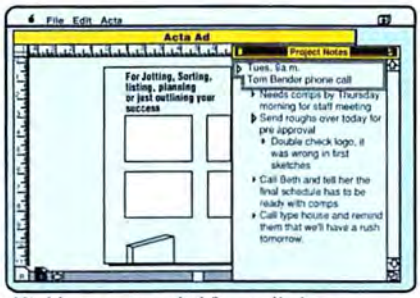
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lems with programs that worked fine before, don't panic and start screaming "Virus!" It is much more likely that your problem is the result of a damaged System file. As INITs and cdev files have become more popular, many problems turn out to be caused by interactions between these programs.

So before you cry wolf, try replacing your System files and removing INITs and cdevs. If the problem goes away,

Before you cry wolf, try replacing your System files and removing INITs and cdevs.

reinstall the INITs and cdevs one by one until the problem recurs and you can determine at least part of the problem. For long-term stability, choose the INITs and cdevs you use very carefully and try to limit their number.

Pinstripe Picks

Here are some products worth a look if you're worried about viruses.

Vaccine (CE Software). A cdev that monitors your system for suspicious events. Provided free as a public service, available on CompuServe and other major on-line services.

Interferon (Robert Woodhead). A program that checks for virus infection and tampering after the fact. Available on CompuServe and other major on-line services. Free, although a donation to a charity is requested.

Redux (Microseeds). Excellent back-up and recovery program that features scripting for custom backups.

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AutoCAD on the Macintosh also supports the features that have made Apple the acknowledged leader in user interface design, offering pull-down, tear-off, and pop-up menus, complete support for Multifinder™ and the Mac windowing system, along with file dialog boxes to make access to your drawing files quick and easy. Clipboard support allows the transfer of AutoCAD drawings to a wide variety of Macintosh applications software.

A Better Perspective. AutoCAD is an advanced three-dimensional modeler that helps you solve design challenges on your Mac the way you would with physical prototypes. AutoCAD makes 3-D easy with user-defined construction planes, dynamic viewing and multiple viewports.

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For even greater utility, AutoCAD provides entity handles that allow external applications to associate alphanumeric information, such as part numbers and capacity ratings, with graphical elements in the drawing. This associativity is creating an entirely new generation of useful third-party applications software.

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Hundreds of third-party programmers have used AutoLISP to develop entire systems that make AutoCAD perfect for applications ranging from chemical engineering to technical publishing. Many of these programs run on the Mac II and more are on their way.

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MULTIMEDIA

Multimedia: *About Interface*

It has been said that knowledge is power, and subsequently that the personal computer is a prime mover toward empowerment. Once that empowerment belonged exclusively to an elite programming priesthood, but those days are over. Today teachers, artists, doctors, filmmakers, dancers, biologists, and a broad spectrum of other folks are harnessing the power of the computer as a fresh medium of expression, of experience, and of learning.

Remember the first time you saw a Macintosh? Remember when you first grabbed the mouse and watched the cursor move around the screen? For most Mac users the graphic interface came as something of a revelation. It offered a new, visual means of interacting with a computer. Instead of requiring cryptic, typed command codes, the desktop metaphor allowed you to manipulate data intuitively. It made using a computer much easier than it had ever been before. For the first time, the computer itself was largely subservient to the tasks it performed.

TENETS, ANYONE?

Before there was an electronic desktop, there was a command line interface (CLI). When a person sat down at a computer employing CLI — and we're not mentioning any names — the user spent a lot of time staring at a greater-than sign, known in those early days as a *prompt*. Believers in CLI thought this was a wonderful way to communicate with a computer. They called the desktop metaphor things like *gimmick* and *fad*.

They were incorrect.

There is a rich history behind the desktop metaphor, and it has been justly pointed out that the Mac owes much to its forebears. Xerox Star begat the Lisa, the Lisa begat the Macintosh. The conceptual framework of the Macintosh interface precedes even that of the Star, dating back to the pioneering work of an insightful group of people, including Doug Englebart, Adele Goldberg, and Alan Kay. These people and many others made a very basic realization about personal computing: The way a user interacts with a computer is as important as the computation itself; in other words, the *human interface,* as it has come to be called, is as fundamental to computing as any processor configuration, operating system, or programming environment. The evolution of icons, point-and-click, overlapping windows, dialog boxes, pop-up menus, and click-and-drag grew directly from these tenets.

This philosophy further postulates that the ultimate goal of computer technology is, in a sense, to make the computer disappear, that the technology should be so transparent, so invisible to the user, that for practical purposes the computer does not exist. In its perfect form, the computer and its application stand outside data content so that the user may be completely absorbed in the subject matter. In its perfect form, the human interface is entirely that — it allows a person to interact with the computer just as if the computer were itself human.

Consider for a moment that the Macintosh interface really is a graphic simulation of abstract data components. Here's a folder; there's an application; they reside on a given volume. By providing the user with a picture of these components and by allowing these components to interact intuitively, the components become tangible, concrete, real. In a single leap even a naive user is able to explore, under-



BY THE *MACUSER* FEATURES STAFF

stand, and effectively use a Macintosh in a short period. An "electronic desktop" is a very effective metaphor when you are seeking a visual organizational structure on a personal computer.

FIXING METAPHORS

Now let us expand the visual metaphor to a learning structure. The goal here is to provide a metaphor for a different kind of leap that allows a naive user to explore and understand some manner of information very quickly. Isn't that the task a computer should do best? Imagine the vast numbers of simulations and visual structures that could lend themselves to a learning process. And what if in the process you could harness the power of digital audio, full-motion video, and multiple tracks of exploration?

That's multimedia.

Multimedia can be used for as many tasks as there are imaginative people to create them. Multimedia takes on many meanings; depending on whom you talk to, you might even find it called by an entirely different name, such as *hypermedia* or *interactive video.* But at its heart, multimedia revolves around the concept of the ongoing development of the human interface within the computer. And in so doing, it provides interested users with a new and powerful medium for presenting information.

Interactive multimedia looks, sounds, and behaves like a buzzword. As such, it's a term that lends itself exceptionally well to pontification, pie-in-the-sky, and gee-whizism. At *MacUser* we have gone around in circles trying to slip a definition around the term that fully describes it without unnecessarily circumscribing it. When we say *interactive,* we mean that the user is more than a mere observer, but is a part of the communicative process. When we say *multimedia,* we mean a combination of text, pictures, diagrams, animations, sounds, and animated and/or live-action video.

Multimedia is the place where TV, movies, audio, computers, and publishing meet.

But the problem with the term is at its core a simple one: The process of definition nearly always consists of breaking a term down into its component meanings. However, in the case of *multimedia,* we are speaking of a term that in and of itself denotes a convergence rather than a divergence. The visual computer (including the Mac), the CD-ROM disc, the CD-audio disc, the laser videodisc, the graphic digitizer, the audio digitizer, the writable-optical disc, and several other emergent technologies are all heading for the same place at the same time.

There's likely to be an explosion when they hit.

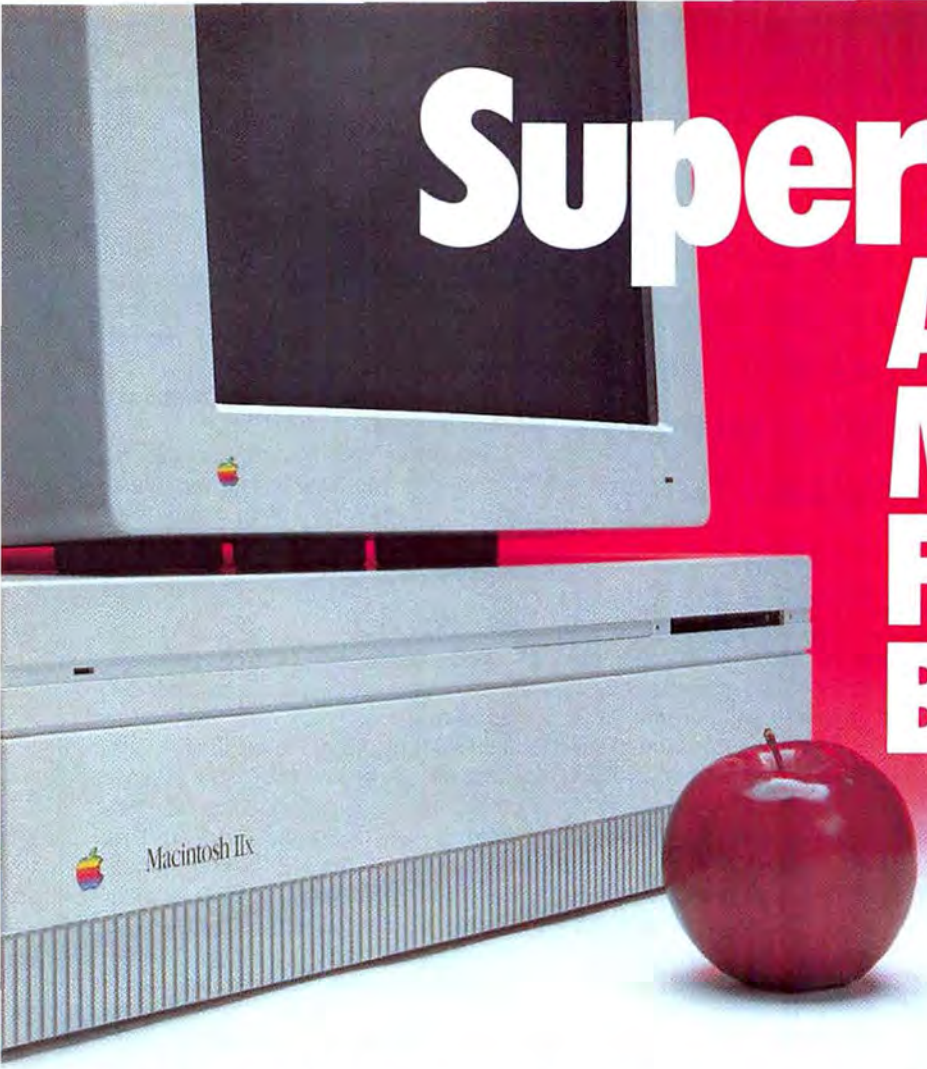
Whatever else you care to call it, interactive multimedia is the place where TV, movies, audio, computers, and publishing meet. This is where our exploration begins.

INTUITION HIKE

With multimedia, the postulate remains that an intuitive approach is superior to a nonintuitive one: Mac users are ahead of the game in this respect, as knowingly or not, they have accepted the notion as soon as they've mastered the use of a mouse. Add to this the corollary that a human being learns and retains best when looking at a map, hearing a sound, watching a moving picture, or choosing a path. Multimedia offers exactly this capability.

In the most minimal sense, the Macintosh interface has always provided a multimedia experience: The Mac beep from the outset has been used as an admonishment for an errant mouse click, and so combined audio with visual information. Today, new technologies have built dramatically upon that most primitive of beginnings. Digitized audio and fast hard dis s have brought high-quality sound to the





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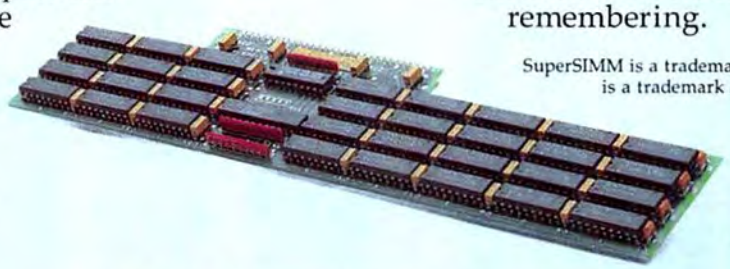
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Mac. Scanners and video digitizers offer clear, crisp graphic input. The Macintosh II brings color to the graphic interface. Mac-controlled laser videodiscs usher in a new realm of potential via random-access National Television Standards Committee (NTSC) video. Speech recognition products now emerging will bring voice input to the human interface. Body-tracking products currently in development will anticipate your wishes by detecting exactly where your eyes are looking or how your hand grasps objects depicted on-screen.

In general, however, two technological advances have made multimedia possible. The first is in the area of storage: The advent of optical discs containing computer data as well as video images and audio has been critical to the realization of multimedia. Videotape, though proven in its ability to record moving pictures and sound, is extremely limited in its capability for random access. Laser videodiscs, in contrast, offer random access to more than 54,000 frames of still or moving video, with optional stereo sound, in a matter of seconds. Magnetic media, though among the most widely used peripherals in the computer world, are limited in their size. A single, removable CD-ROM disc can contain nearly ten times as much data as a 60-megabyte hard-disk drive. If even that won't

MULTIMEDIA

Lippman on Interactivity

DEFINING INTERACTIVITY IS A GAME ONLY the courageous should play. Andy Lippman, head of the Paperback Movies Project at MIT's Media Lab, once bravely obliged Stewart Brand by offering a preliminary definition, which we paraphrase here. Using a conversational model, Lippman opposed his model to a lecture. Thus, in any conversation, interactivity is simply made up of the give and take of two participants, often — but not always — working toward some common goal. In order for this model to work, several things must be built in:

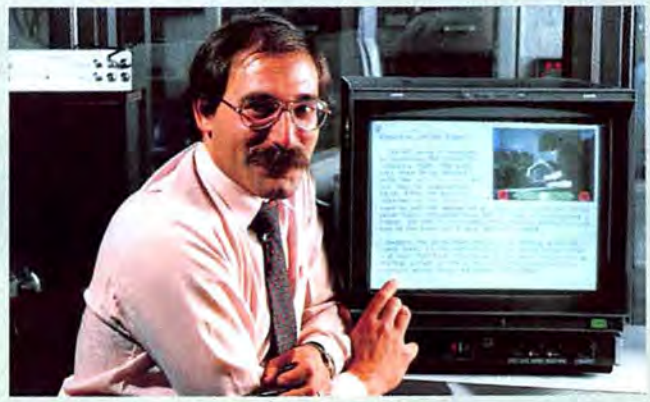
• **Interruptibility.** Each individual in the conversation has to be able to interrupt the other. It must be a mutual, simultaneous interchange. It can't be merely alternation between fixed choices. Therefore, avoid building a system that has a limited number of fixed default paths that you have to go down in order to get anywhere.

• **Granularity.** What's the smallest size of the building blocks of a project that determine whether the system succeeds at being interactive or fails? Is it the word or phrase in a conversation? In a play, the act is too big to interrupt, so is it the scene? In the play, it could be what Stanford professor Larry Friedlander calls the *beat*, a unified moment in the unfolding of a scene, like the cycle of a breath.

• **Limited look-ahead.** You can't have precomputed everything you're going to say, but how far ahead of where you're talking are you thinking? Since the goal of the conversation is one that arises interactively, you don't know how far you're going to digress.

• **Graceful degradation.** If a request is made that can't be answered, it's gracefully deferred; it doesn't annihilate the system.

• **The appearance of infinitude.** At the same time you can't precompute everything in the system, you still have to give the impression of an infinite database. For example, in the Movie Map of Aspen, Colo., you have many choices: You can drive through the city, back up, change your view, change the season, go into any one of ten buildings, and talk to people that you find there. You have the illusion of an infinite exploration. (From *The Media Lab*, Penguin Books, 1988.) — *MM*



Andrew Lippman, head of the Media Lab's Paperback Movies Project.

suffice, just change discs.

HYPERSPECTIVE

The second technological advance to make multimedia possible concerns hypertext delivery systems. The advent of HyperCard and other interactive authoring systems for the Macintosh heralds the emergence of a new type of software, which is not a word processor, nor a spreadsheet, nor a database, nor a game, though it may combine certain elements of all of these. In even the humblest HyperCard stack we may discern a quick glimpse of this emergent software category — a category that combines the interactivity of the Macintosh interface with text, graphics, animation, and sound in interactive multimedia. Most importantly, these elements are linked dimensionally so that their relationships with each other are physically embodied in the structure of the

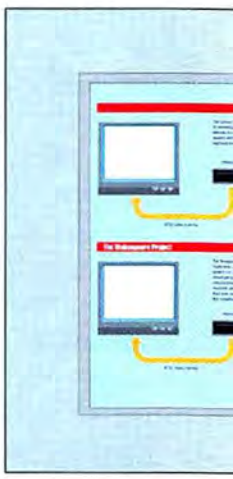
MULTIMEDIA TODAY: FOUR PATHS TOWARD THE FUTURE

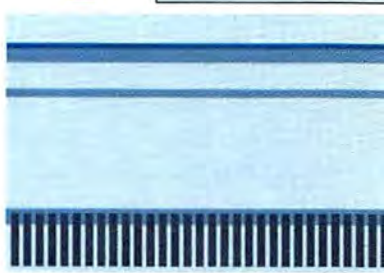
Electric Cadaver Page 100



The Electric Cadaver is a teaching tool for students of physiology and anatomy. Text, graphics, and stereoscopic videodisc-resident images provide the student with a dynamic medical text that can be explored however the student wishes.

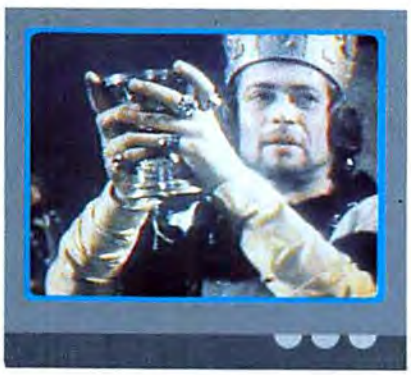






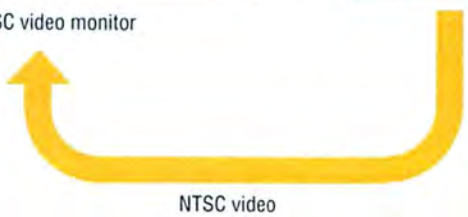


The Shakespeare Project Page 109



The Shakespeare Project at Stanford University is a multimedia approach to teaching the Bard. The system combines graphics, computer animation, filmed performances on video, a large database, simulations, and word processing. Students can compare performances, study stagecraft, create their own simulated staging, and write an analysis that includes links to the video material.





stack (see "Discovery by Design" in the Hyperspace section).

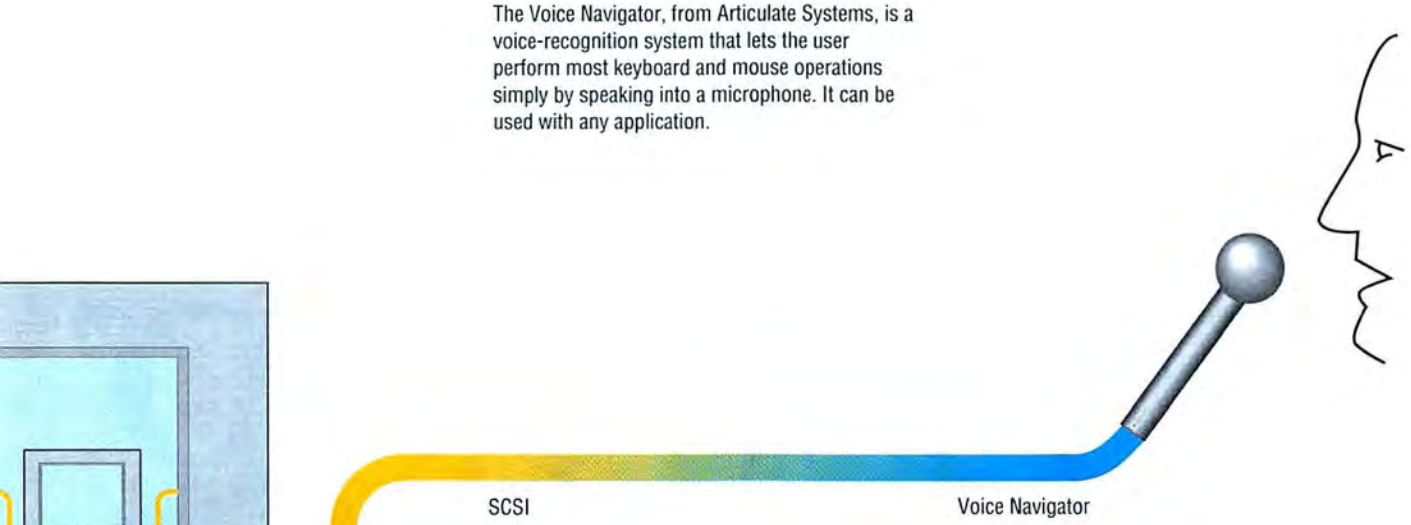
This is where we may draw a distinction between multimedia and interactive multimedia. If you use a desktop video system to create a videotape with your Macintosh and then lay down a sound track, you have created a multimedia presentation. But the real potential of the computer is in offering the user alternate paths; interactive multimedia transforms the user from passive observer into active participant, greatly heightening the impact of a presentation. For the purpose of discussion here, the term *multimedia* will refer in nearly all cases to the interactive variety.

So what are the goals of multimedia? One is to link and to present information in a manner more nearly like that we employ inside our own heads. That means pictures, sounds, words, and multidimensional links. Another

The Voice Navigator

Page 106

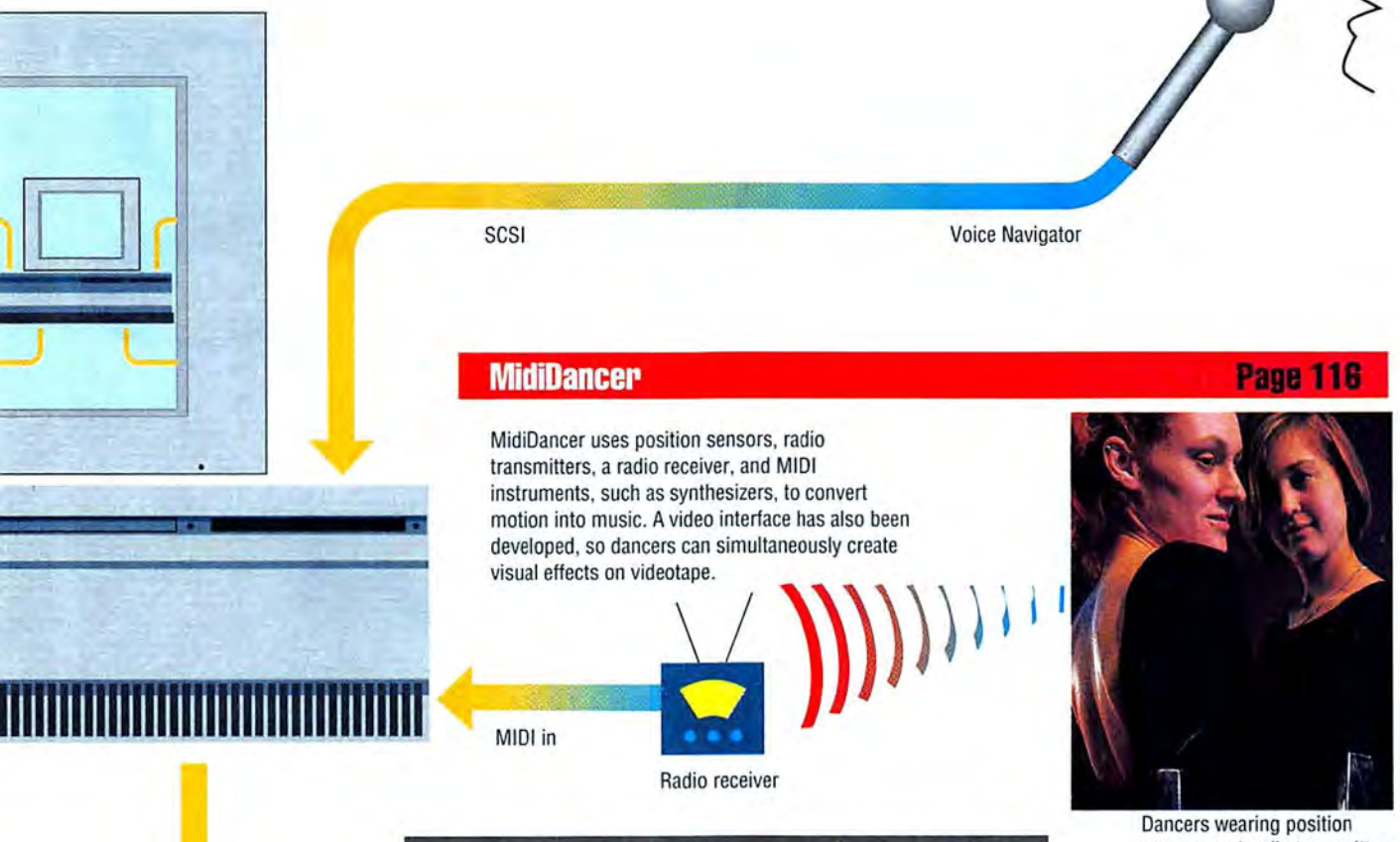
The Voice Navigator, from Articulate Systems, is a voice-recognition system that lets the user perform most keyboard and mouse operations simply by speaking into a microphone. It can be used with any application.



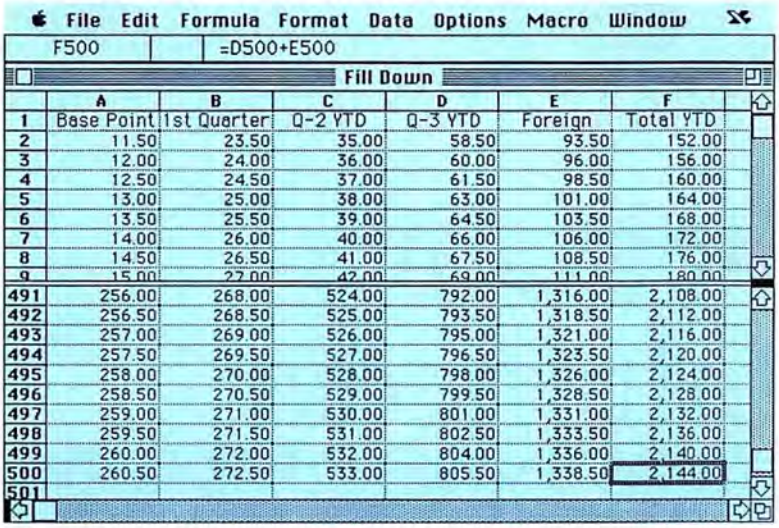
MidiDancer

Page 116

MidiDancer uses position sensors, radio transmitters, a radio receiver, and MIDI instruments, such as synthesizers, to convert motion into music. A video interface has also been developed, so dancers can simultaneously create visual effects on videotape.

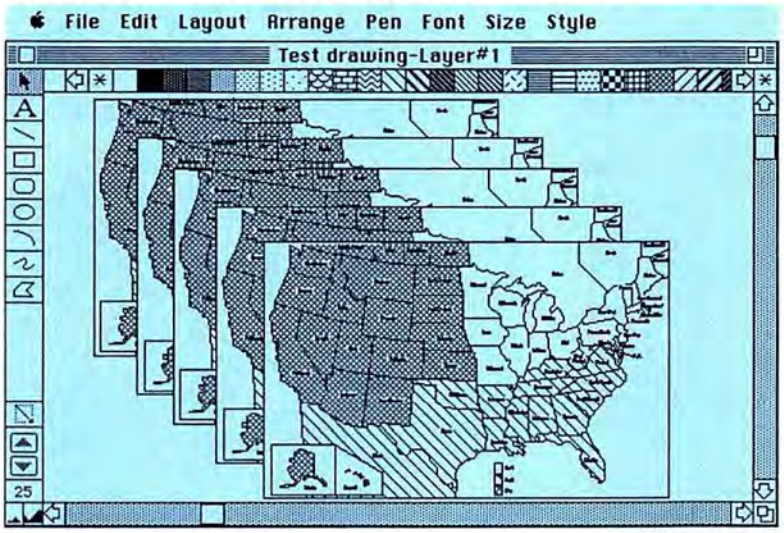


Quit wasting time.



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3	12.00	24.00	36.00	60.00	96.00	156.00
4	12.50	24.50	37.00	61.50	98.50	160.00
5	13.00	25.00	38.00	63.00	101.00	164.00
6	13.50	25.50	39.00	64.50	103.50	168.00
7	14.00	26.00	40.00	66.00	106.00	172.00
8	14.50	26.50	41.00	67.50	108.50	176.00
9	15.00	27.00	42.00	69.00	111.00	180.00
491	256.00	268.00	524.00	792.00	1,316.00	2,108.00
492	256.50	268.50	525.00	793.50	1,318.50	2,112.00
493	257.00	269.00	526.00	795.00	1,321.00	2,116.00
494	257.50	269.50	527.00	796.50	1,323.50	2,120.00
495	258.00	270.00	528.00	798.00	1,326.00	2,124.00
496	258.50	270.50	529.00	799.50	1,328.50	2,128.00
497	259.00	271.00	530.00	801.00	1,331.00	2,132.00
498	259.50	271.50	531.00	802.50	1,333.50	2,136.00
499	260.00	272.00	532.00	804.00	1,336.00	2,140.00
500	260.50	272.50	533.00	805.50	1,338.50	2,144.00
501						

Excel with Excel. It takes almost 17 seconds to fill this spreadsheet on the Mac SE. Or less than 4 seconds with the Excelerator XL25 board.



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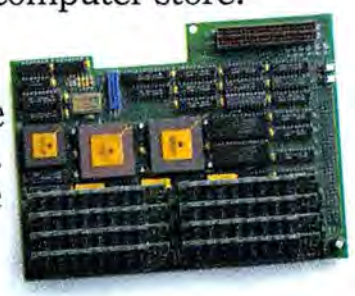
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Interactive Multimedia:

Discovery by Design

significant goal of multimedia is to provide a learning environment dramatically richer than any that has come before. Among other benefits, multimedia provides the potential for a learning experience once possible only through personalized instruction. By providing both vivid presentations and individual paths of discovery, multimedia transforms you into your own best teacher.

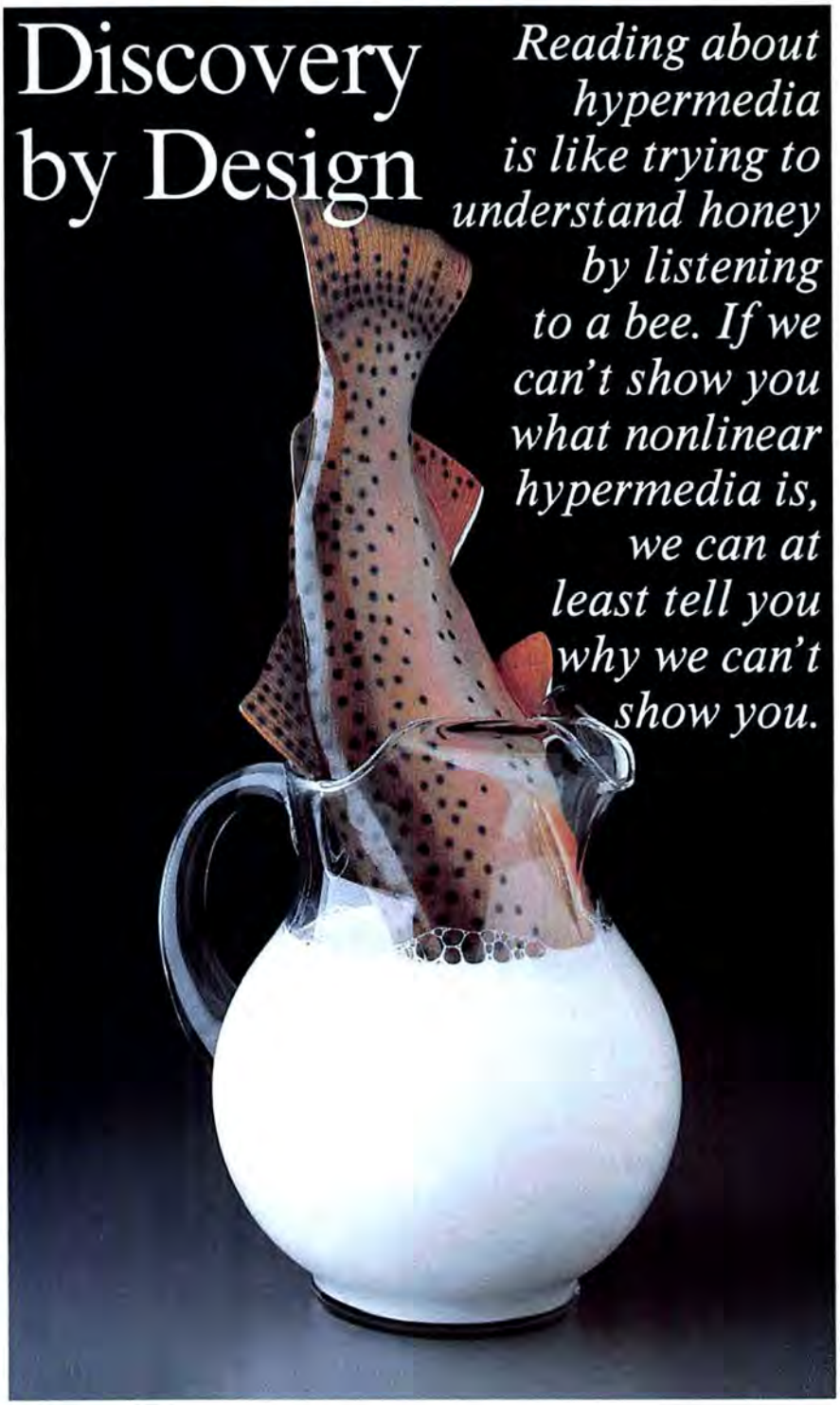
STUFF LINKS

We've taken steps this month to convey the essence, as well as the significance, of multimedia. First, we've attempted, insofar as it is possible in this 2-D magazine medium, to depict graphically the dimensionality of links, the emphasis on interrelationship, the power of push buttons, as well as the nested levels of explanation possible with multimedia. You'll enter this section next. There you'll be able to browse through a cross section of projects, each representing a specific set of multimedia potentials. You'll get a feel for the hardware, goals, methods, authors, and potentials of each. We'll then return to a linear format to present our conclusions, along with a look at the future of the human interface.

Second, we've devoted a portion of this month's Hyperspace installment to a preview of SuperCard, a new multimedia environment from Silicon Beach Software. Educators and potential multimedia programmers will not want to miss this section. In addition, this month Michael Swaine explores fractal generation with HyperCard in Card Tricks.

Third, and perhaps most significant, we are announcing the formation of the *MacUser* Media Laboratory. Its premier release, concurrent with this issue, is the HyperCard stack Discovery by Design, itself a further exploration of the topic of interactive multimedia. The disk is available by mail to all interested readers (see the Hyperspace section for details). It picks up the discussion where this issue leaves off, offering in the process an actual taste of the synergy of graphics, sound, animation, and interactivity that only a Macintosh can deliver.

— JOHN J. ANDERSON



CARTER DOW

On television the other night, a guy sharpened a pencil. It so happens the pencil was mounted to the right front strut of a helicopter: The guy was piloting the helicopter. The guy was so good at piloting the helicopter that he was able to insert the pencil into an electric sharpener moored to a table that was bolted to the ground. And so the guy sharpened a pencil using a helicopter. To quote John Davidson, "That's incredible."

The advent of desktop publishing dramatically realigned the personal computer market. The unique graphic capabilities of the Macintosh and the sophistication of its custom laser printer catapulted the system to the front of the pack. The Mac and LaserWriter quickly set a new standard in quality output. Today even the most trivial note is apt to look better than *The New York Times.*

And yet using a Macintosh as a machine that generates pieces of paper, no matter how lovely, is a bit like using a helicopter to sharpen a pencil. It wastes natural resources, horsepower, time, and technology, simply to impress. Pencils and paper existed long before helicopters and computers. In both cases, the past has been artificially forced upon the future.

PUMPING IRONY

Now, we're not here to knock DTP. Paper has proved itself quite a handy medium for the past 5,000 years or so, and it's unlikely to slip out of fashion anytime soon, despite the pronouncements of yesterday's computer pundits. Trees may quiver their branches in fear, but the paperless society is as far away today as it ever has been. If we are indeed committed to pumping out reams of paper, the least we can do is to pump out smart-looking pieces of paper.

But to miss the colossal irony here is fatal to an understanding of the subject matter we embrace. Our context: The idea of using a computer to create books, periodicals, and memos has assuredly helped popularize the computer — and seriously shortchanged it in the process. For the real power of a Macintosh (or any other computer) is

The Joy of Cooking *inhabits two dimensions; our minds inhabit at least three*

in organizing information much more powerfully than can ever be conveyed in the linear manner of the printed page. This new, *extralinear* means of representing information is a potent newborn medium. Its final destination is not a piece of paper but an electronic screen. This endows it with certain unalienable rights. There are wrongs as well. But the potential has yet to be recognized, yet to be explored in a systematic fashion.

Expositions like the one you are reading now follow a linear form of argument. P posits hot, P posits cold. But the mind is more than a mere linear device. The mind is an associative device — a multidimensional device. Think of the word *corn:* a handful of associations may come to mind almost simultaneously. You might think of painful feet, Orville Redenbacher, a cob pipe, Thanksgiving decor, the Green Giant, Halloween candy, the films of Frank Capra, or a summer barbecue. Your mind "images" on the dimensional geography of your experience. Aspects of this geography are linear, other aspects are not. No one image is any more "likely," any more "right" than another. It is up to context to narrow the field.

OH, SHUCKS

An index gives a book one extralinear means of accessing information. Here is the entry for "corn" in *The Joy of Cooking:*

Corn, about 273
a la King, peppers stuffed with, 289
canning, 752
chowder, 158, 167
Creole, 274
croquettes, ham and, 218
flour, 499
fritters, and ham, 222
fritters or corn oysters, 274, 275
grilled or roasted, 273
husks, for wrap cooking, 130, 131
off the cob, cooked, 273
on the cob, 273
pudding, Cockaigne, 274
pudding, frozen, 769
relish, 784
salad, or field, 77
scalloped, 274
syrup, about, 506
souffle, 205
soup, cream of, 158
succotash, 274
Tamales, 275
timbales, egg and cheese, 208

This entry is followed by lengthy entries for corn meal and corned beef. The entries are in themselves linear, with the idea that the reader will reach for the book's index with a relevant context at hand.

But where's the popcorn?

We have all experienced the disappointment of having an index let us down — by failing to include the entry we are looking for, or by treating that entry in a manner we were not expecting. The information inside the book *The Joy of Cooking* inhabits two dimensions; our minds inhabit at least three. Our disappointment is caused by happening upon the limits of the medium. It never feels good to hit the wall. At least the index saves us some time: Otherwise we might have to read the entire book merely to discover there's nothing in it concerning popcorn.

REACHING THE KERNEL

Linear media represent wholes as the sums of their parts. This seems entirely reasonable, as it fairly represents cause and effect. A causes B, which in turn causes C, and that's how we explain the trout in the milk. But linearity, while critical to mathematics and logic, is only one component of knowledge. The magic of an extralinear structure is that it *mimics the mind* in the creation of wholes that are *more* than the sums of their parts.

But what is it that makes something more than the sum of its parts?

When we envision component parts of a system in a three-dimensional rather than a linear relationship, it becomes immediately clear that the

proximity, linkage, and relationships between these component parts are literally "thrown into relief."

Linear media are best at empirical tasks, such as causal argument and definition. Definition is the naming of things, the assignment of chunks of meaning necessarily short on context, information as viewed in two dimensions. Knowledge, in contrast, is always about context, always about perspective. It is more than a mere "count" of features or facts. Knowledge is about linkages and relationships. Knowledge has a terrain — a topography — associated with it. The sum of a group of parts results in a list. This is linear. The linkage between those parts results in a multidimensional map of their interrelationship. This is extralinear.

RUBBER MEETS THE ROAD

Let's take a ride. We'll get in the car and drive to a new place, a place we've never been before. A map will certainly help, but we're going to require some hours behind the wheel, some real experience on these new roads before we can claim we know them. Much of this experience will come from approaching the same landmarks from different directions, to develop a feeling for how the roads interconnect: how pieces of the puzzle we've already come to know fit with pieces of the puzzle on which we're about to get a grip.

This is how the mind learns. As a pattern-recognition machine, the mind is without parallel. Learning the roads in an area consists of creating linkages in your mind. Make a left here, follow the one-way street up past the corndog stand, and you'll get to the wide boulevard where the designer popcorn store is. Particle physics is learned in exactly the same way. Stay in the middle lane when you see the electrons orbiting the nucleus, follow the neutrons down the ramp to the quarking garage. Get the nucleus to pop, and you can destroy the world. To learn anything, you need to create a geography for the subject area in your mind. The more complete, the more accurate your internalized terrain, the greater your knowledge in a given subject area.

This mental geography we describe consists of several components. It consists of pictures, of words, of metaphors, of contrasts, of digressive stories, of mnemonic devices, and, yes, of linear descriptions. We may refer to these components as *levels of explanation.* A book may contain maps, diagrams, indices, and glossaries, but it is necessarily weak at representing the relationships between nested levels of explanation.

Memorization is a function of duty; Knowledge comes from love

Now, we're not here to knock books. Books have proved themselves quite a handy medium for the past 3,000 years or so, and they're unlikely to slip out of fashion anytime soon. And books can depict multidimensional links, too, make no mistake about it. It would be a gaffe to infer from what you've heard about hypermedia that it's something new. If you doubt this, take a close look at the Talmud. The only thing that is new is the delivery system. With HyperCard we can clearly link all manner of media in all manner of directions: That is something a book simply cannot do.

CORRECTIONAL INSTITUTION

We should note that without exception mental geography also consists of irrelevant linkages, erroneous linkages, and omitted linkages. A big part of the discipline of learning is developing an automatic reflex to prune these away the moment they are isolated. This very means of error correction is itself an engine of learning. Its partner is discovery. Discovery is a learner happening upon a link, an insight, an "aha," however humble, with something of the rush of emotion of Columbus sighting land.

In his book *The Media Lab,* Stewart Brand quotes Albert Einstein as saying, "Love is a better teacher than duty." If it's platitudes we're trading, we'll take it a step farther. Memorization is a function of duty; knowledge comes only from love. And the love we speak of is the love of discovery.

Statement of theme: We now have a tool with which to represent internal mental geography via external medium. It is a technological tool, and for lack of a better term, we call it interactive multimedia.

Fade to black.

STRANGERS IN PARADIGM

When the motion picture first happened on the scene, filmmakers were unable to conceive of the medium outside of the paradigms they already knew. As a result, they securely bolted the camera down in front of a stage play, and made a direct record of the proceedings from the point of view of a good seat in the audience. It took more than 20 years and the vision of pioneers such as D. W. Griffith to realize the true power of the motion picture.

Techniques we take for granted today, like camera angles, dollies, pans, cuts, close-ups, parallel action, flashbacks, and so on — these were devised and mastered by people of great imagination. The people who innovated the grammar of motion pictures were able to break through existing paradigms. They were able to maximize the potential of a new medium by creating new tools using that medium itself.

Now we stand at a threshold conceivably more significant than that of the advent of the motion picture. And yet, some early results bear little more interest than Sarah Bernhardt's filmed portrayal of *Norma* (1906). There is incipient "kitchen sinkism" evident in many CD-ROM titles today. That is a tendency to bolt a developer's system securely in front of a large database and make a direct record of that database.

The thing that we lack, the thing we shall spend the balance of this century and much of the next perfecting, is a bridge between information and knowledge. If we are equal to the task, we will create a new and powerful means of learning. And in the exciting process we shall invent the grammar of a new, interactive medium.

But first, we need a good sharp pencil. Anybody seen the keys to the chopper?

—JOHN J. ANDERSON

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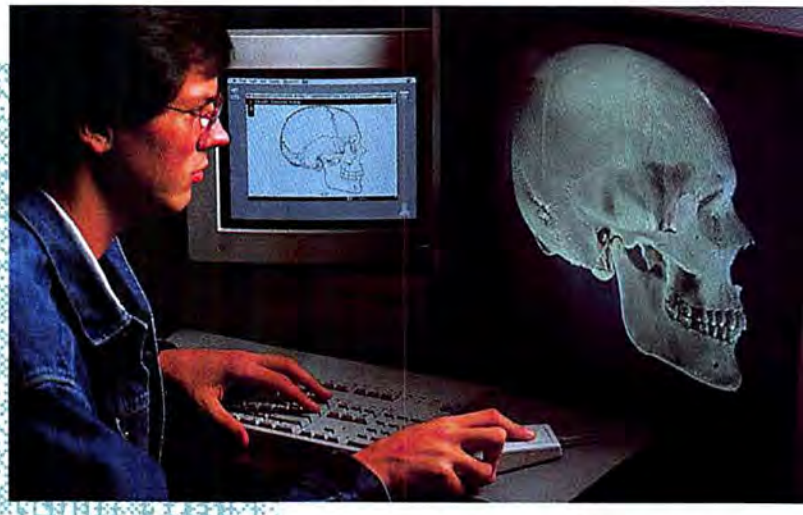
MULTIMEDIA

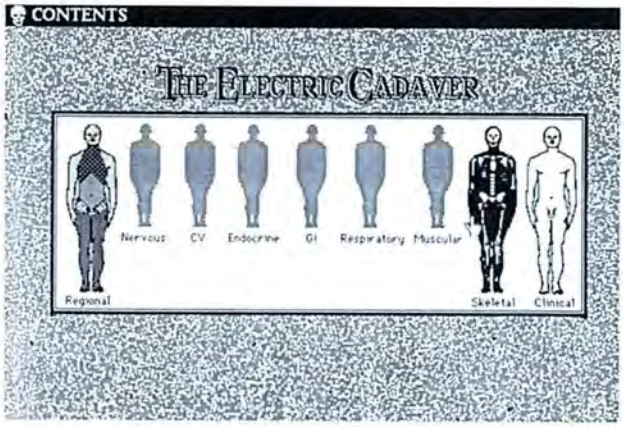
The Body Electric

"Does it hurt here?" asks a medical student while moving the mouse to a specific spot on the Mac screen.

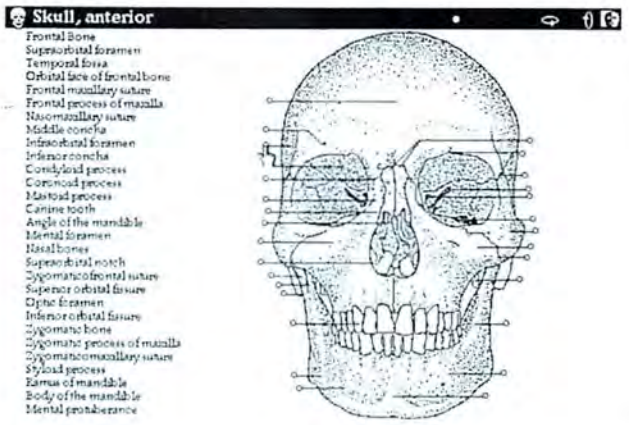
By clicking, the student pokes the depicted patient's hand with a "pin" to determine where nerve damage has occured by laceration. The patient answers, with a "yes," "no," or "ouch!"

This is *medical multimedia*, made possible by The Electric Cadaver, created and developed by Dr. Stephen Freedman and Dr. Robert Chase at the Stanford University Medical School. The Electric Cadaver is a media fusion of graphics, text, and images of the human body designed to aid medical students in their physiology lessons. Students can learn anatomy by scanning through images of bones, muscles, tendons, and internal organs. In addition to images, there are textual explanations of concepts (such as bone development) and systems.





The Electric Cadaver is more than an anatomy primer. For instance, a student can examine bone development in a person over a number of years. Within this same context, he can also look at the makeup of an individual bone.



This view of the skull is typical of the detail in the Electric Cadaver. Clicking on any of the bone names in list down the side of the screen highlights the particular point on the skull diagram. Conversely, clicking on a call-out will highlight the name of the bone in the list.

If a student wants to have a labeled diagram of the nerves in the hand, for example, he can bring it up with a click of the mouse. There's also animation to demonstrate how muscles and tendons work to bend and straighten the finger.

Freedman himself de-emphasizes the terms *multimedia* and *hypermedia* in the description of his project. "Those are buzzwords," he says. "The project is really an electronic book." According to Freedman, The Electric Cadaver and projects like it are merely the technological embodiment of something that has been going on for thousands of years — the cross-referencing and synthesizing of information from many sources into one.

Dr. Chase is interested in computers only insofar as they can help him teach medicine. He sees the project as a learning tool that goes well beyond anatomy for medical students. "Not only can students study the skeleton and internal organs of the body," he says, "but they can also learn the physical effects of nerve damage or the bone development of the hand from infancy to 19 years. And at every point, text descriptions are just a click away."

THE BARE BONES

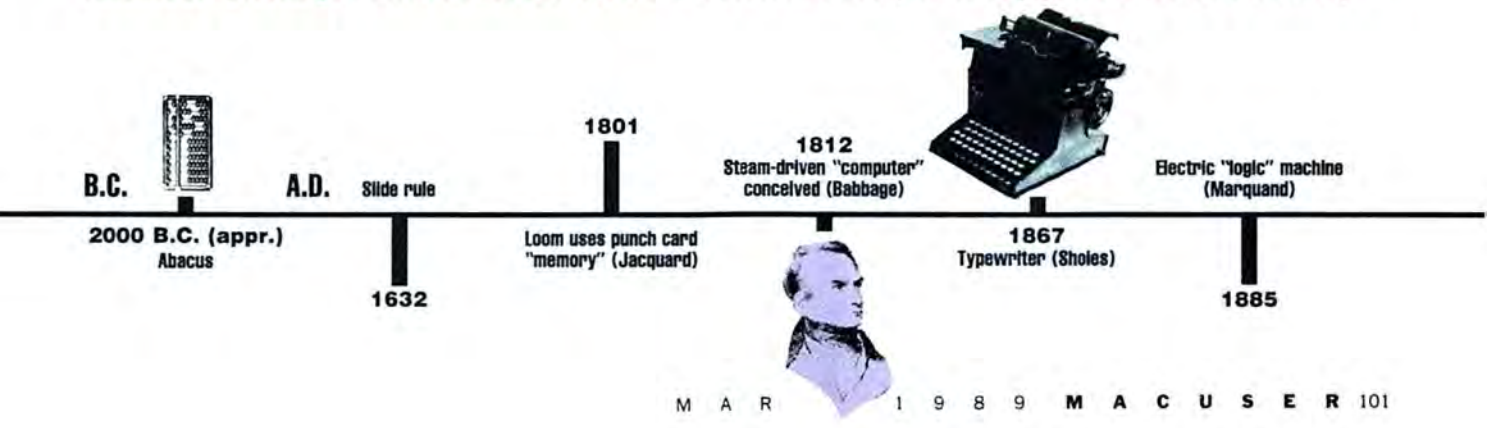
The typical workstation includes a Mac II or SE; industrial laser-disc player; a laser disc; a large-screen, high-resolution color monitor; and software written in HyperCard. If you don't have access to the laser-disc player, you can still work with a scaled-down version of the project using just the Mac SE or II and The Electric Cadaver software. Dr. Freedman indicated that a CD-ROM version was also in the works.

The stack — which contains many scanned images of anatomical systems along with textual information — also acts as a video controller for approximately 7,400 images on the laser disc, by tagging appropriate frames or sequences depicting high-quality still photography. Users can reverse, advance, fast-forward, scan, or just run through a sequence of related diagrams at the click of a button. A mini-editor capability gives students the opportunity to make their own *playlists* (akin to placement of numbered bookmarks in a book) by arranging images in the order they want to present them.

Access for third-party developers' applications to The Electric Cadaver is made possible by a custom tool box included with the stack. This tool box contains the pieces necessary to create entirely new access systems.

The stack itself is a port from an IBM HyperText version of the project, though you wouldn't know it. The stack is beautifully constructed, and though it fails to resemble the Mac or even a traditional HyperCard interface in places, it works smoothly and intuitively. If you have a Mac II, you can call up high-resolution, digitized color images directly to the Macintosh monitor. Getting these drawn, however, is a rather slow process (five sec-

Timeline of Cool Things that Have Made a Difference • The abacus lacked sophisticated graphics but led to the tabulating



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MULTIMEDIA

Context Sensitivity

TYPICALLY, A DEVELOPER BUILDS CONTEXT sensitivity into a system by creating *hot spots*, points in a presentation or program where help screens can be called up that are pertinent to the operation in question. In an interactive multimedia project, context sensitivity has a broader utility: It's the engine of transmutation, the way information in one form is transmuted to information in another. In the context of a video presentation, say, of an anatomy lesson, the collar bone can be displayed concurrently with data; click on a part of the collar bone on-screen and a short, technical description could appear. Other programs can use running text along with a videodisc presentation: On a two-monitor system, you see the film running by on the video display, while commentary scrolls along with it on your Mac screen. You stop the videodisc, click on an annotation button, and more information comes up on what you're viewing. In the digital world, sights become sounds, sounds become words, the word *duck* becomes a mallard flying across your screen. — *MM*

onds or so for an image to appear on-screen). Access to photos on the laser disc is quick — no more than two seconds in a worst case, and usually almost instantaneous.

EYE AM A CAMERA

Interestingly, the superlative photos on the laser disc were taken by Bill Gruber, the inventor of the ViewMaster viewer. In photographing the dissections, Gruber used his three-dimensional camera system, using dual lenses positioned at the average distance between human eyes. He hoped to show that by studying three-dimensional images, students could train their eyes and brains in a manner superior to any two-dimensional system. Dr. Chase imagines a day when the three-dimensional images themselves might be viewable from laser disc.

IS THERE A DOCTOR IN THE HOUSE?

While in medical school, Freedman noticed how he and his peers studied their information — reading and taking notes, synthesizing information from multiple sources into a single form. He concluded that, in the course of readings and synthesis, medical students in effect write their own textbooks. He figured there had to be an easier way to synthesize information from as many as ten books covering the same topic but conveying different pieces of information.

After starting a company to publish electronic textbooks, Freedman met up with Chase. By the time the two had developed a working model for The Electric Cadaver project, Bill Atkinson had finished a prototype of HyperCard. Although he originally used SmallTalk as the engine for The Electric Cadaver, Freedman knew that he had to transfer the project over to the Macintosh.

Freedman also points out that, because HyperCard is so widely distributed, it is a very attractive driver for multimedia projects. Freedman believes that Apple has done a great service for projects like The Electric Cadaver by pushing HyperCard and simplifying the process by which development takes place. — KRISTI COALE

MULTIMEDIA

Expert Systems

A GOOD EXPERT SYSTEM IS DESIGNED AS AN adjunct to, not a replacement of, human knowledge. What's more, in a multimedia project, it should encourage and not hinder interaction. In some future electronic newspaper, for example, your expert system would know your likes, dislikes, and what you habitually read, and it could help you sift out the rest. Or in an interactive medical program, a knowledge base of previous diagnoses could help doctors in the treatment of a rare disease. Doctors could x-ray the suspect area and scan it onto a Mac. Then, they could work up an analysis of the examined area in a word processor. Using the image as an interactive "template" along with an authoring system, they could then paste hot spots on the image as notes for the attending specialists and compare what they have found with earlier X-rays of like symptoms, calling up texts of previous case histories. Asking IF/THEN questions, based upon certain rules for inference and known constants based on a database of previous cases, doctors could build prognoses with a greater probability of accuracy. On the basis of all this, they could prescribe paths for treatment. In short, the interactive project, in conjunction with an expert system, would become another diagnostic tool. — *MM*

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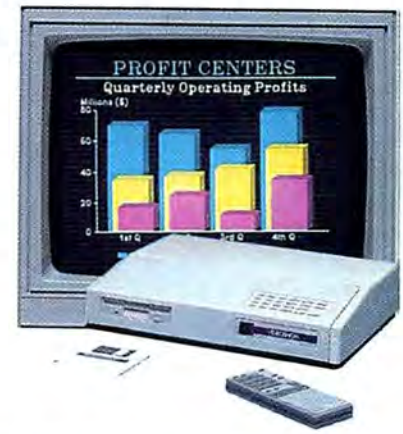
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MULTIMEDIA



"Open the pod bay doors, please HAL."



Say It, Display It

From *2001*'s HAL 9000 to *Star Wars*' C3PO, Hollywood has always loved talking computers. Anthropomorphism softens technology and makes it easier to accept, but it also reveals something fundamental: Next to facial expression and gesture, the most basic form of human communication is speech. If people are ever to communicate freely with their computers, those computers must recognize and "understand" the human voice. Speech recognition is a cornerstone of a next-generation human interface, and Articulate Systems' Voice Navigator is the first effective, commercial Macintosh implementation of a key component.

Understanding what the Voice Navigator does, however, requires a certain amount of downshifting. It will be a long time before a computer can hold a conversation the way we've seen it happen in the movies. It will take computing horsepower and artificial intelligence programming well beyond the reach of today's mainframes.

Voice Navigator is a combination of hardware and software, simply designed so that across applications, those functions best suited to voice are in fact voice-driven (selecting menus, commands, tools, and some cursor control). Those operations best suited to the keyboard and mouse (text entry and precision cursor control) are left to those input devices. In this way, speech can become an essential part of the human interface long before the technological evolution required to create HAL 9000.

FIRST NOISES

The principals of Articulate Systems, Incorporated (ASI) began investigating voice recognition on the Mac in 1986, but even among the design team, which included programmers experienced in the writing of sophisticated Mac code, there was some skepticism about the practical use of such a device. Other companies had tried voice systems before, but the approach had always been vertical: a specific in-

machine, which got some people thinking about ways that information could be manipulated by machines, and soon the





1890 Tabulating machine (Hollerith)

1930 Shannon shows how switching circuits can model Boolean logic

1930 "Differential analyzer" (Bush)

1940 Electronic tubes used as switching units (Atanasoff and Berry)

1945 "As We May Think," *The Atlantic Monthly* (Bush)

1946 Eniac, the first electronic digital computer (Mauchley and Eckert)



terface for a specific application. ASI opted for a more ambitious course, aiming for a general interface that would work within any application, including the Finder. Decisions were also made about how the Voice Navigator would recognize speech. Dictation was dropped at the outset, because the Mac isn't powerful enough to make dictation viable (no personal computer is yet). The platform also meant that recognition would have to be based on discrete utterance, that is, commands separated by minimum silences, as opposed to continuous recognition, which poses greater challenges still.

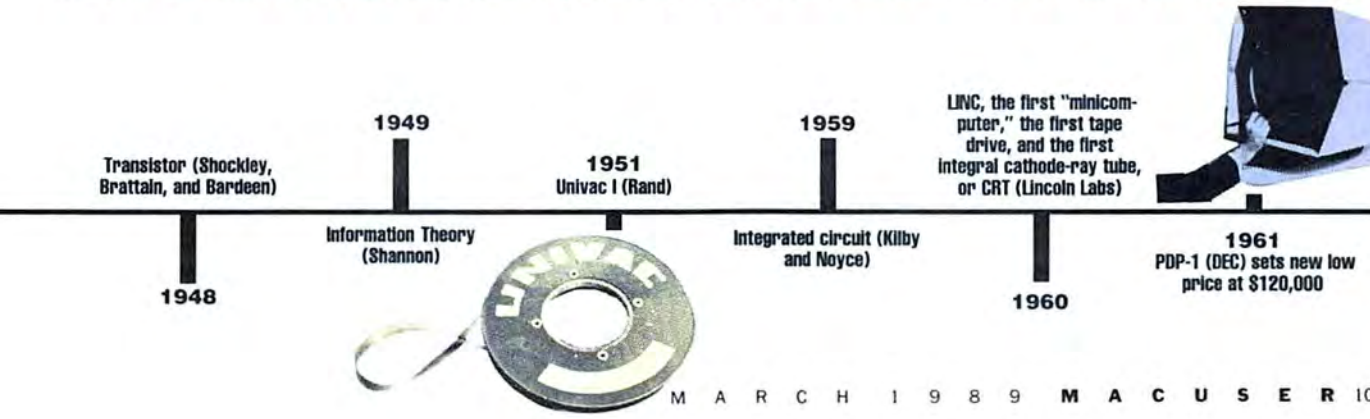
There was also the question of form — whether the hardware portion of Voice Navigator would be a box or a board. While a NuBus implementation would have been cheaper to build, ASI didn't want to limit its market to the Mac II, so they decided to make it a SCSI box.

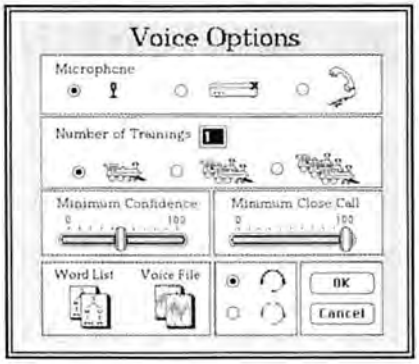
YOU SAY IT, MAC DOES IT

Voice Navigator's work starts with microphone input (from an external mike, its own internal mike, or even a telephone). This signal passes through an analog/digital converter and is then sent to an internal digital signal processing (DSP) chip for filtering and compression. This compressed signal is then passed to the Mac for recognition. As powerful as the Voice Navigator hardware is, it's actually the Mac CPU that still does most of the work.

For recognition to take place, the user must have already "taught" the Voice Navigator how he pronounces each discrete command (this training can be done from within an application, but the majority of commands are recorded beforehand). ASI's system is speaker dependent and will work with any language or accent. The user says the word, and the Voice Navigator's software creates a template of that utterance. If a word is repeated several times during the teaching session, the template becomes more generalized, increasing the recognition

computer had come into its own, albeit remaining horrifically expensive, and the idea of an intuitive interface was way off, though





The Voice Navigator's Voice Options dialog box is where you set the input parameters for your voice-training sessions.

rate. Command sets, which are saved like any other file, are application specific, but they can be transferred between programs that have similar commands (MacDraft and MacDraw, for example). To keep the command files as small as possible, ASI compresses the signal, reducing an average word to 400 bytes and a 1,000-command file to 400K.

Once the templates have been set up, the program looks for a best match and then executes that command. But since not every utterance will match perfectly, the user can specify a "minimum confidence level" required for a command actually to be carried out.

Earlier speech-recognition systems often failed because of their limited vocabularies; ASI's solution is a hierarchical system. Voice Navigator's command vocabulary is only limited by level, so depending on which model you use, you can have 200 (or 1,000) usable commands at the menu level, another 200 (or 1,000) if one of those menu commands has a dialog box or pop-out menu, and so on. This approach increases flexibility and lets the user place any command at any level. So a frequently used dialog box option, even if buried three or four levels down, can be placed on the main menu level, making it instantly available. The unlimited vocabulary also permits synonyms, so "Undo," "Scratch that," and "Forget it" could all do the same thing, which, conversationally, is much more natural.

The wide vocabulary also permits a certain amount of context sensitivity. For example, in the Finder, saying "Left" can mean "move the cursor continuously to the left," but "Move left" can mean "move the cursor ten pixels to the left," while "Scroll left" can mean "scroll the window to the left." The modifiers provide the context.

TALKING TO THE FUTURE

ASI's Voice Navigator is the first commercial example of a voice interface for the Macintosh, and its implications are staggering. For interactive systems, it could swiftly become the interface of choice, freeing the user from the keyboard and even the mouse. Voice recognition will increase computer accessibility among the disabled, and it could even change the conventional notion of what a file is.

The Voice Navigator isn't restricted to command execution. It can also be used as a record and playback device, so voice annotation is now possible. A doctor updating a patient's record, for example, could digitize his comments and save them as an appended file that could be played back with just a click.

While it isn't HAL 9000, the Voice Navigator is a major advance in the humanization of computer technology — the ultimate goal of a next-generation interface. — RUSSELL ITO



the rudiments were devised by visionaries in the late '60s, who foresaw the day of an easy-to-use personal computer with



1964 — BASIC programming language (Kemeny and Kurtz)

1968 — Mouse, windows, multiple-raster monitors, interactive technology demonstrated (Englebart)

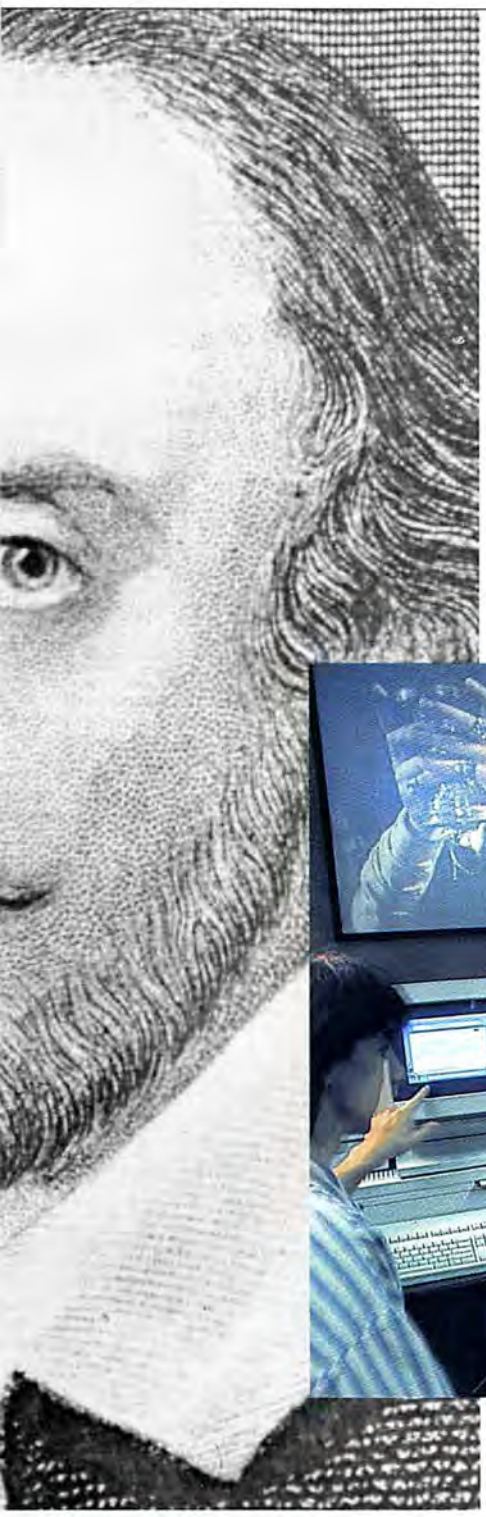


1969 — Alan Kay's doctoral thesis describes theoretical personal computer

1970 — The Architecture Machine Group (Negroponte)

1971 — Intel 8008 microprocessor (Hoff)

1972 — Smalltalk programming language conceived (Kay)





MULTIMEDIA

The Inter-Play's the Thing

". . . Soft you now. The fair Ophelia! — Nymph in thy orisons Be all my sins remembered."



Stanford Professor Larry Friedlander (r), with programmer Michael Korcusca and Polanski's Macbeth.

A pouting Ophelia greets Nicol Williamson's Hamlet and returns some of his gifts. He turns on her, accusing all women of infidelity and treachery while at the same time expressing his longing for her and calling himself unworthy. Williamson's Hamlet plays with her feelings because he wants to seduce her. Click. A somber, Russian Hamlet broods under a stairway. He humiliates and terrifies a fragile Ophelia. He's not teasing or lascivious, as Williamson was. He's violent, paranoid, suspects her of treachery and resents the attraction he feels for her. This is Stanford University's Shakespeare Project, a HyperCard-based interactive multimedia system designed by Shakespeare professor Larry Friedlander and HyperCard programmers Michael Korcusca and Charles Kearnes, with support from Apple Computer. Using a HyperCard-controlled videodisc player, students can stop, start, view, and review selected sequences; compare and contrast different versions of a particular scene; design their own versions of a crucial

tremendous graphics and point-and-click capability. Meanwhile, hardware technology was making strides, and with the



1973
First bit-mapped graphics-oriented monitor

1973
Appearance of Alto, precursor to Xerox PARC's Star operating system



1973
First hand-held mouse (with Alto from Xerox PARC)

1974
Computer Lib (Nelson)



1975
Altair 8800 (first "personal" computer)



1976
Wozniak designs Apple II


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In the Shakespeare Project, exploration's the thing. From left to right: Orson Welles' Macbeth, Roman Polanski's Macbeth, a Russian Hamlet, Nicol

episode on a computerized, digital stage; peruse an archive of hundreds of historical photographs and drawings of sets, costumes, and props, choosing those that suit their own interpretation; and create their own "case study" of a character's motivation and psychology. The project is a result of Friedlander's longstanding efforts to teach Shakespeare, but its implications go well beyond the Bard.

LAY ON, MACDUFF

Books take words and pictures out of "real time," letting readers approach the material at their own pace, without regard for its original order. The Shakespeare Project lets you handle a filmed performance the same way. You can take it out of real time, examine it, analyze it, annotate it, rearrange it, and put it back together in different ways. Teachers of theater now have a multipronged approach to a complex topic. Combining the three traditional ways of teaching drama — reading the text, watching a performance, and working on a production — the Shakespeare Project encourages students to see the text as a skeleton for widely varying interpretations. The project offers five linked approaches: performance, study, a theater game, browsing, and a notebook.

THE PLAY'S THE THING

The current version of the Shakespeare Project contains major scenes from Hamlet, King Lear, and Macbeth, each with two actors' interpretations on videodisc. As the video rolls, the student examines Shakespeare's text, the subtext (what the student or teacher imagines the characters are thinking, as opposed to what they're saying), beats (discrete moments or "breaths" in the tempo of a performance), and blocking (the actors' stage position). As a scene unfolds, two synchronized fields scroll with it on the Macintosh screen. The first shows Shakespeare's play, as well as the blocking information. The second contains the subtext, which can also be played over the original sound track. While watching the performances, a student (or teacher) can take and compile notes, as well as add, change, or delete annotations. You have complete control over what you're viewing, and because the system is linked horizontally as well as vertically, you can even bring up a parallel version of a scene and toggle between them. A Camera button lets you tag a portion of the video material and save it to a file for inclusion in an essay written with the program's word processor. When the Snapshot icon has been pasted into such a document, a click replays the sequence.

THE BOOK AND VOLUME OF MY BRAIN

The Study area is the conceptual heart of the program and is based on work by Shakespearean actors, directors, and theoreticians. Various tutorials take the student through a wide range of materials, using a variety of techniques including playing games, giving show-and-tells, building film montages, acting a sequence, writing an essay, and conducting a simulation. The Study area avoids question-and-answer drills, emphasizing that there is no "last word" on a performance.

ALL THE WORLD'S A STAGE

If Ophelia is in love with Hamlet, how does her body language change in reaction to Hamlet's curse: "Get thee to a nunnery?" In the theater game, a student can construct animated simulations and plan the actors' positions on the stage. The object is to give as concrete a sense as possible of the choices a director must make in physically blocking out a scene. The student is given a choice of stage types in which to place the props: a traditional Elizabethan set, a proscenium with doors and windows, and a blank stage that's divided up on a grid for exact placement. Drawing upon a database of furniture, beds, rocks, trees, columns, and a file of ten characters — five in traditional dress and five in modern dress — the student then sets the stage. To build an animation, the student places a character on stage and moves it around with the mouse by clicking on its feet and dragging. The character can be moved stage left, right, up, or down and can be made to sit down, stand up, kneel, or lie down by clicking and dragging on its waist. The head

appearance of the two Steves, the affordable microcomputer became a reality. Xerox executives failed to realize the importance






1977 Microsoft is founded

1978 Bricklin writes VisiCalc

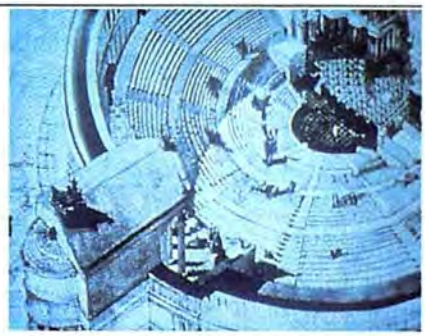
1978 Hayes announces Micromodem 100

1979 Steve Jobs visits Xerox PARC

1980 Xerox, DEC, and Intel announce Ethernet

1982 Apple debuts Lisa





Williamson's Hamlet, an example of Elizabethan dress, and a sketch of the Bard's Globe Theater.

and body can also be rotated. A recording device lets the apprentice director build an animated sequence out of the figures' movements. Editing is possible, provided a figure starts and finishes in the same location as in the first take.

MORE THINGS THAN ARE DREAMT OF

The Browsing area houses the system's database. The current version contains over 5,000 images from films, photos, and drawings, though not all of them may be used in the final version since the copyright laws covering interactive multimedia aren't on the books yet.

The Browsing area also contains discussions on theater history, costumes, and props for staging simulations.

I AM FOR WHOLE VOLUMES IN FOLIO

The Notebook is the student's personal workspace, and it contains a word processor. Notes taken during any of the foregoing performances, tutorials, stagings, or browsing can be stored here.

AND THEREBY HANGS A TALE

The Shakespeare Project was originally designed on an IBM system. Friedlander began an early PC version of the project using touch screens but gave it up upon being plagued by registration and alignment problems — sometimes you'd touch the screen and nothing would happen. The key to the port was the greater flexibility and control the Mac interface and HyperCard offered. HyperCard allows the teacher and user to modify contents and structure continually, as well as to add or subtract elements.

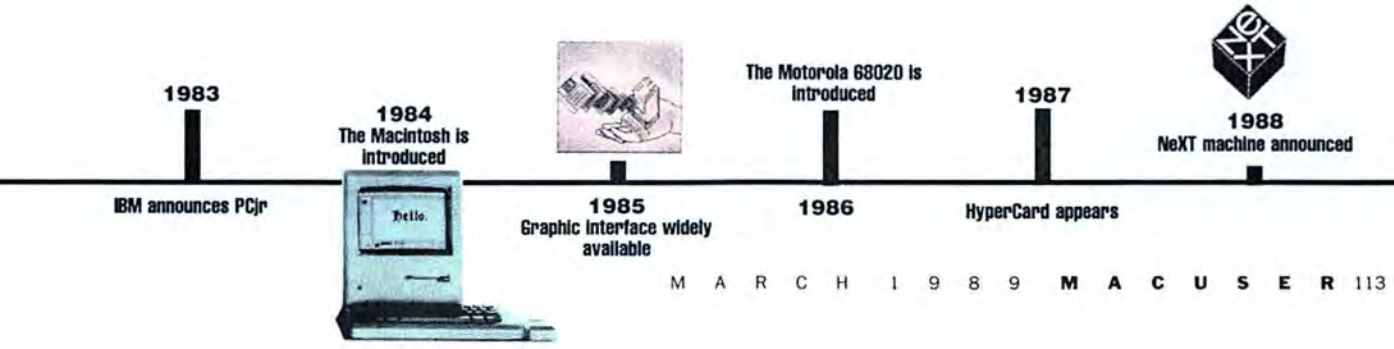
So the work goes on. Friedlander is already investigating how to incorporate some of the advantages of a single-screen system — such as graphic overlays, hot spots on the video itself, and zooms and pans that are built into the film experience — into the Shakespeare Project. With so much possible, the field finds its voice in Prospero's closing words: "Let your indulgence set me free." — MICHAEL MILEY

MULTIMEDIA

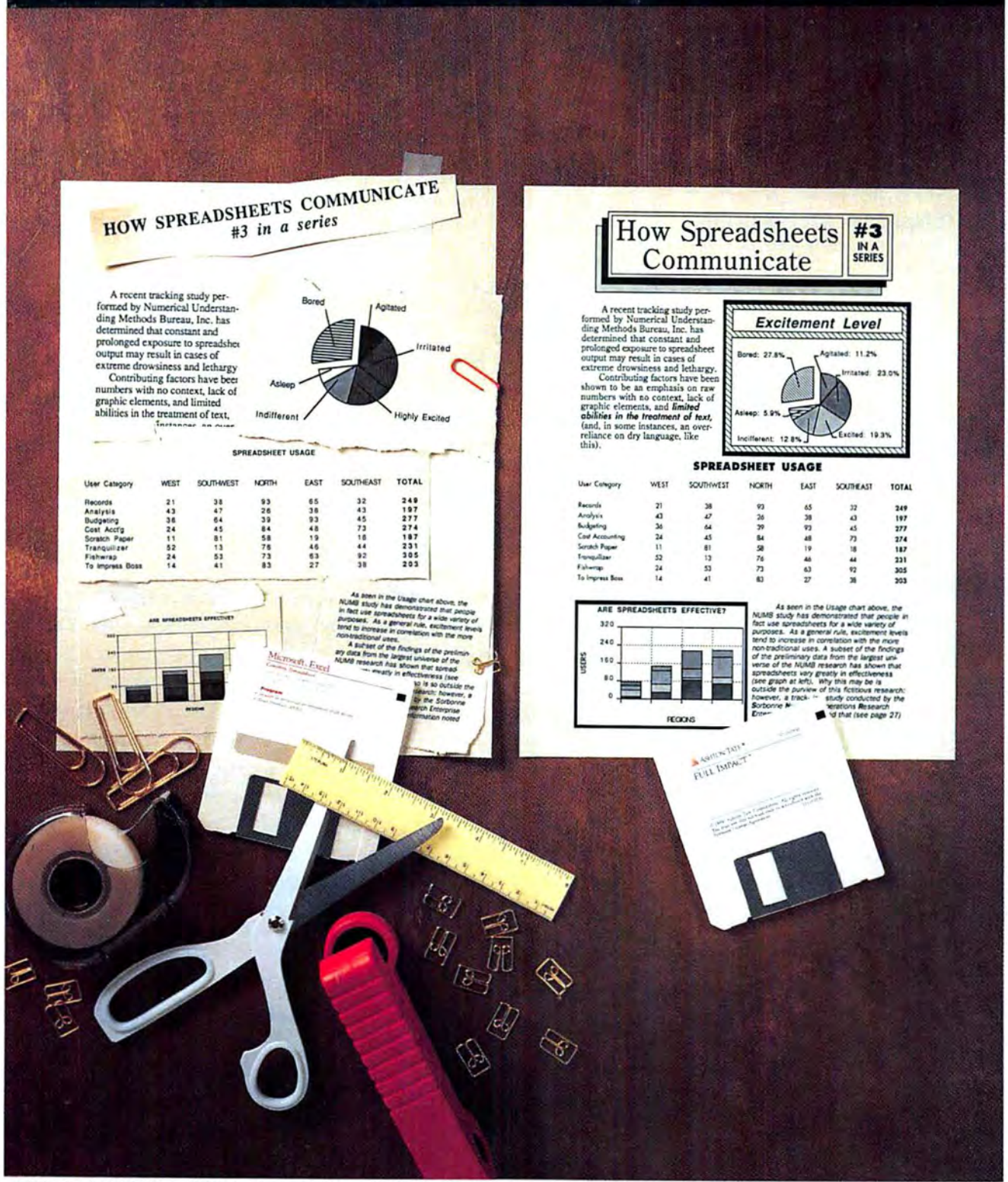
Simulation & Animation

REAL-TIME SIMULATION AND ANIMATION will help move the computer beyond awkward interface models and will be a critical component of interactive media. To simplify, what computer simulations attempt to do is to project some operation forward, based upon some series of constants and variables. A simulation can be anything from an economic one projecting inflationary trends, to a geological one measuring seismic activity should an earthquake occur, to a psychological simulation based upon some known factors of how people behave in certain circumstances. Some simulations are extremely precise renditions of "what if" situations, requiring the calculation of thousands of difference equations run on a Cray supercomputer. Others — like the blocking simulation in the Shakespeare Project, in which you plan actors' positions onstage — require nothing more than that you escort some animated characters around a computer stage and record their motion. — *MM*

of the graphical interface, but Steve Jobs succeeded, though not with the ill-fated Lisa but with its progeny, the Macintosh.



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The music is the master, and the dancers are the slaves. The partnership isn't dynamic. But if that immutable score were replaced with a computer that could interactively generate a score from the dancer's choreography, the tyranny of the written note would be broken. And that is exactly what Mark Coniglio — with the assistance of a toy store — sought to do with his experimental MIDI system, MidiDancer.



STEVEN A. GUNTHER

MidiDancer's inventor Mark Coniglio, with his creation in hand.

TIMESTEPS

Coniglio, a student at the California Institute of the Arts' Music School in Valencia, began the project three years ago under the impetus of famed electronic music composer Morton Subotnick. At the time, Subotnick was trying to find a way to trigger a synthesizer during the performance of a composition entitled *Hungers*. The problem Subotnick faced was that he wanted a MIDI synthesizer to respond dynamically to the human musicians on stage, rather than the conventional response — wherein the people are at the mercy of electronic playback. The notion of combining live musicians and technology wasn't particularly new. But most previous attempts had used magnetic tape as part of the process, which was inherently limiting because tape is rigidly linear. If you want to change tempo without changing pitch, pick a new voice, or skip a passage, you simply can't do it easily enough to make it feasible in a performance. And the same holds true for electronic instruments. All the necessary musical information can be prepared and stored in memory, but unless there's a musician on stage to operate the system, there still isn't any interaction with the musicians.

At the time, Subotnick and Coniglio had begun experimenting with an electronic instrument called Airdrums: a pair of wired drumsticks with built-in position and velocity sensors that could be used to generate MIDI signals simply by beating the air. At Subotnick's suggestion, Coniglio took that technology and applied it to Subotnick's problem. And when *Hungers* was given its premiere two years ago, it was indeed the answer.

SOUND AND MOTION

The fact that Airdrums could successfully turn motion into music encouraged Coniglio to explore further possibilities. Specifically, he wanted to apply the principle of those electronic drumsticks to his compositions for dance. The fruit of his labors was MidiDancer, a MIDI system that uses position sensors, radio transmitters, a radio receiver, and a Mac to play MIDI synthesizers, thus turning motion into music.

To use the system, two position sensors are attached to a dancer's arm and leg joints, and each sensor is connected to a small transmitter that's also attached to the performer. The transmitter then broadcasts the sensors' positions back to a radio receiver at fifty times per second. The receiver translates the radio signals into MIDI and passes along the MIDI signal to the Mac, which in turn sends it out to the various MIDI instruments on line. Each of the sensors transmits on one MIDI channel, so each performer can transmit two MIDI channels simultaneously. But the system configuration actually determines the number of MIDI instruments being controlled. For example, MIDI channel 1 might be feeding three synthesizers. Coniglio



has four sets of transmitters with two sensors each, so his dancers can control up to eight MIDI channels. (A future version may raise that number to the maximum of 16. Coniglio has also said that a workaround could take the number even higher.)

The restriction to elbows and knees is a result of the sensors measuring angular rather than absolute positioning. The sensors themselves are simple *potentiometers* that look like small knobs. The sensor is attached to the elbow or knee and then connected to anchor points above and below. As the dancer opens and closes an arm or bends and straightens a leg, the potentiometer senses angular position and sends this value to the transmitter. At present, Coniglio is working on a sensor for head positioning as well.

The decision to abandon Airdrums' wired approach was made fairly early in MidiDancer's development. Coniglio realized the impossibility of ever applying his creation to choreography if it wasn't done wirelessly. But that decision created new problems. Working without the enormous financial support of the MIT Media Lab, which had already developed a wired full body-tracking suit, Coniglio then had to find off-the-shelf radio transmission, receiving, and position devices that were small enough to be concealed on a dancer's body, inexpensive enough to buy, and reliable enough to be free of radio interference. He found his answer in a toy store.

Coniglio discovered that by modifying the electronics in some radio-controlled toy cars, he could have his interface at a very low price. Not only that, the system proved to be completely free of radio interference, so

MULTIMEDIA

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the most significant change he had to make was converting the receiver output into MIDI.

But naturally the hardware is only half the story. There's the software, too. Coniglio's program, which he calls Interactor, is the heart of MidiDancer. Before the concert, the performer/composer must program the voices, rhythms, and so on that will be triggered during the performance. MIDI musicians can actually do this well beforehand in the application Performer and then import that file into Interactor.

Interactor works by dividing the full range of an arm or leg extension into 64 discrete parts that are then related to specific tones, notes, chords, rhythms, and so on. For example, an arm movement that stops in the range of divisions from 0 through 10 might generate a flute, while the same motion extended into the range from 25 through 30 might produce a ragtime piano. And since the software is velocity sensitive, the speed of a motion can create a pitch or volume change.

Because Interactor is structured as a series of conditional IF/THEN/ELSE statements, a wide variety of MIDI events can be produced. So, for example, a performer can trigger a patch change by performing the same motion several times in a row or simply by doing nothing for a specified period of time.

The two lead dancers equipped with MidiDancer's position sensors and transmitters.



STEVEN A. GUNTHER

ON POINT

MidiDancer is still an experimental project, but it was scheduled to have its public debut at a series of CalArts concerts on February 17 through 19, 1989. Meanwhile, Coniglio continues working on it, and he expects to have an icon-driven version of the software finished sometime in 1989.

For users who aren't involved in music or choreography, MidiDancer might seem pretty arcane, but the implications of Coniglio's work are extraordinary. What he has done is to explode the familiar two-dimensional interface into a three-dimensional one. Instead of being confined to a screen, users can now use physical motion as their interface — no keyboard or mouse required. And he's already working on a video interface that will let the dancers trigger video effects during a performance. Given that, it's not unreasonable to see figurative animation a short step away. But there are implications even beyond that. Consider this: You could learn sign language by actually making the gestures and seeing the text appear on screen — without ever touching the computer. Robotics, which up to now has required incredibly tedious hours of point-by-point programming for motion and positioning, could be greatly accelerated with a robotics motion recorder. And at some time in the near future, you could find yourself in a computer simulation in which you walk through rooms, open doors, and pick up objects simply by walking and making the appropriate hand and arm motions. MidiDancer is obviously not this sophisticated yet, but it is an important first step on the path to a new level in the sophistication of the interface.

— RUSSELL ITO

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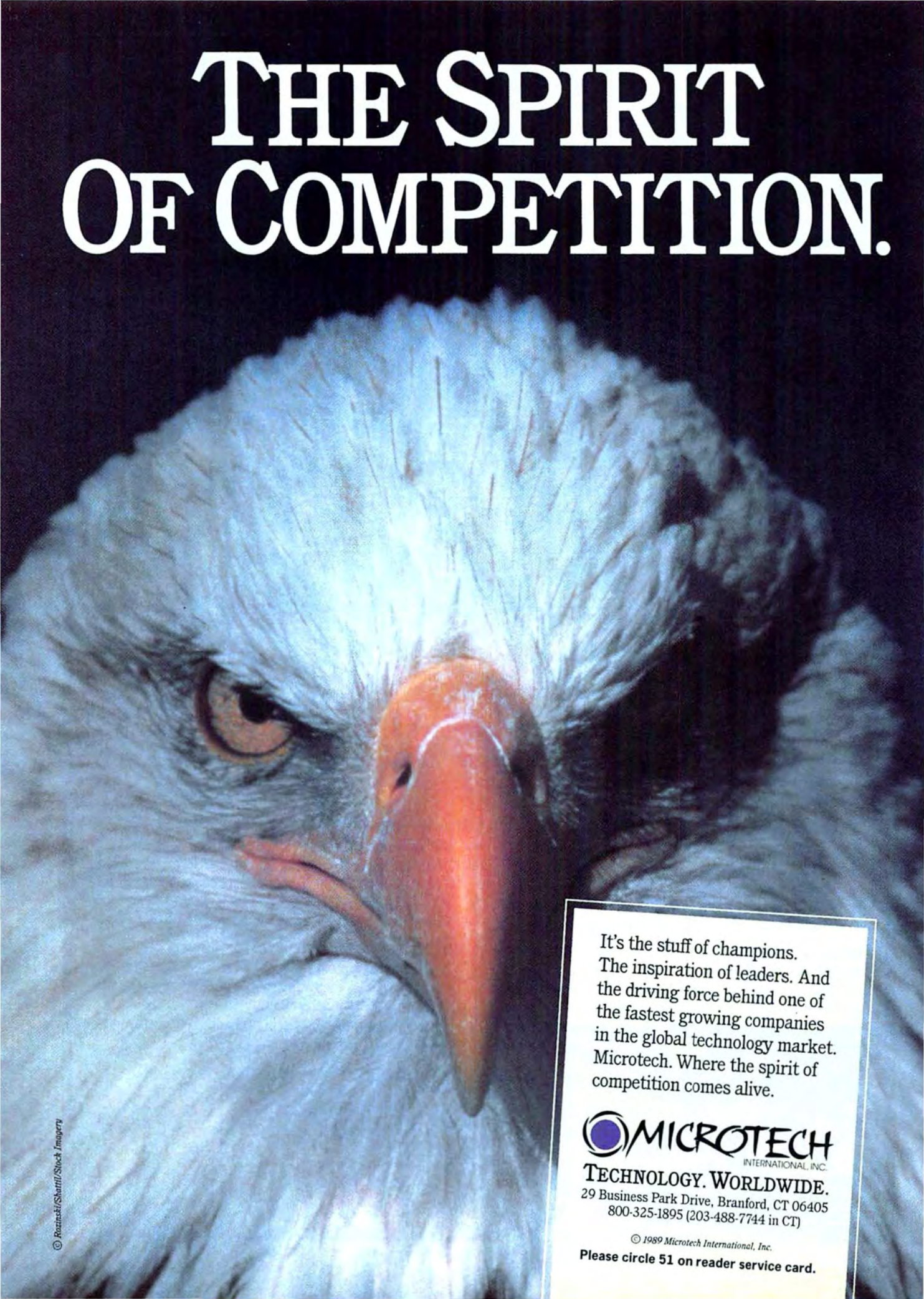
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Modern Interface Technology

Up until the Mac II, the Mac was known for its portability, among other things.

Back in 1976 at the Massachusetts Institute of Technology's Architecture Machine Group (AMG), the Mac progenitor was a room-sized personal computer you'd direct from an Eames chair. Your arm was the cursor, tracked with sensors, and your voice the keyboard. You sat in the chair and pointed at a wall-sized electronic map of the Caribbean and issued commands: You'd say "Put that" and point at a ship; the system would ask "where?" and you'd point "there." The ship would vanish from its former spot and reappear at its new location. In its present-day incarnation, the "Put That There" project has migrated into the pilot's helmet, where in real or simulated flight over a computer-enhanced landscape, the pilot issues voice commands and points with his eyes.

The "Put That There" project is just one of many that has captured the energy and imagination of Nicholas Negroponte over the past 15 years. Current director of MIT's Media Laboratory, the immediate successor to the AMG, Negroponte sees a convergence of broadcasting, publishing, and computers redefining media research: What were once studied as discrete technologies must now be understood as a single topic, developed as a single project.

At the crux of it all, spurring media development, is the human-machine interface. The exploration of human cognition, sensation, and interaction is the means to develop these technologies, an idea that Negroponte has managed to convey to key players in the relevant industries. The Media Lab is generously funded by scores of major corporations involved in media, film, and computer technology, as well as the U.S. military. To name a few: all the major networks, RCA, 3M, General Motors, the Defense Advanced Research Projects Agency (DARPA), IBM, major Hollywood studios, major newspapers, Japanese corporations, and Apple Computer. The Media Lab receives a $2-million-a-year grant from Apple for Alan Kay's Vivarium Project, a study in simulated ecosystems.

"The Media Lab was founded on original work in the man-machine interface," says Negroponte. "'Put That

Photos, from left to right: the "Put That There" project; an overview from the Architecture Machine Group's Aspen Movie Map; a video transcript from the multimedia project "Marital Fracture" of the Visible Language Workshop.







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Alan Kay's simulated sharks, from the Vivarium Project.

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Its effects were deep and far-reaching. Throughout the 1970s, design ideas and people bandied back and forth between Negroponte's AMG and Alan Kay's teams at Xerox Palo Alto Research Center (PARC). The desktop metaphor for a more human interface to computers, and Apple's decision to go with it, began with AMG's theories on spatial data management and ruminations on the ways people remember best. "Concurrently, at Xerox PARC, the notion of direct manipulation of screen objects was being developed. Part of their thinking took into account our theories on spatiality," Negroponte remembers. "These technologies met in the Macintosh."

In 1977, the research at MIT formulated some crucial interface concepts. Negroponte and coresearcher Richard Bolt — author of the 1984 text *The Human Interface* and director of the Human Interface group at MIT, which investigates the use of eye tracking in computer interface — noted that "two individuals, arguing a topic in front of a blackboard, will refer each other to diagrams, equations, and terms on the basis of where they had been written, even long after they have been erased." Back in ancient Greece, Simonides, a poet known for his feats of memory, had discovered something similar. He created a "memory palace" where he stored memories in "rooms." The rooms served as mental cues, and at Xerox PARC the notion of cues was combined with spatial data management on the Star computer. These develop-

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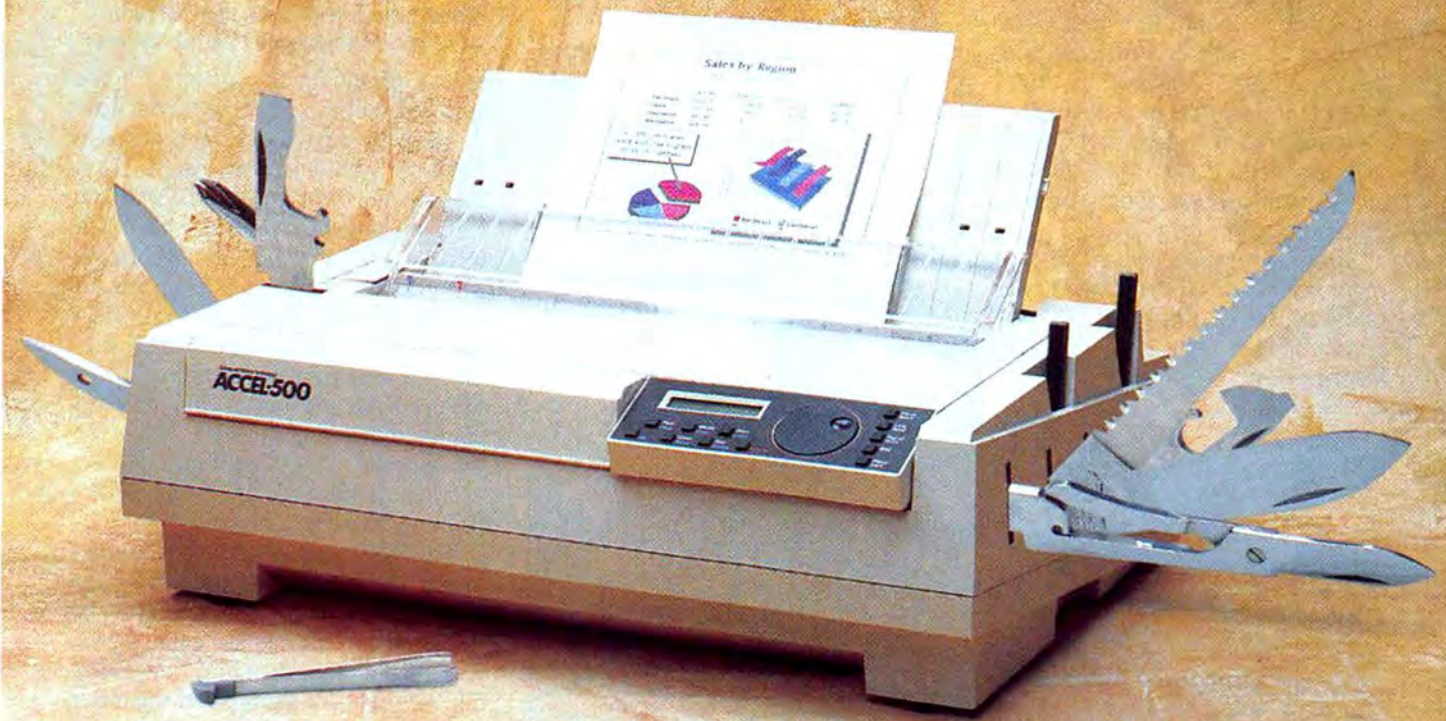
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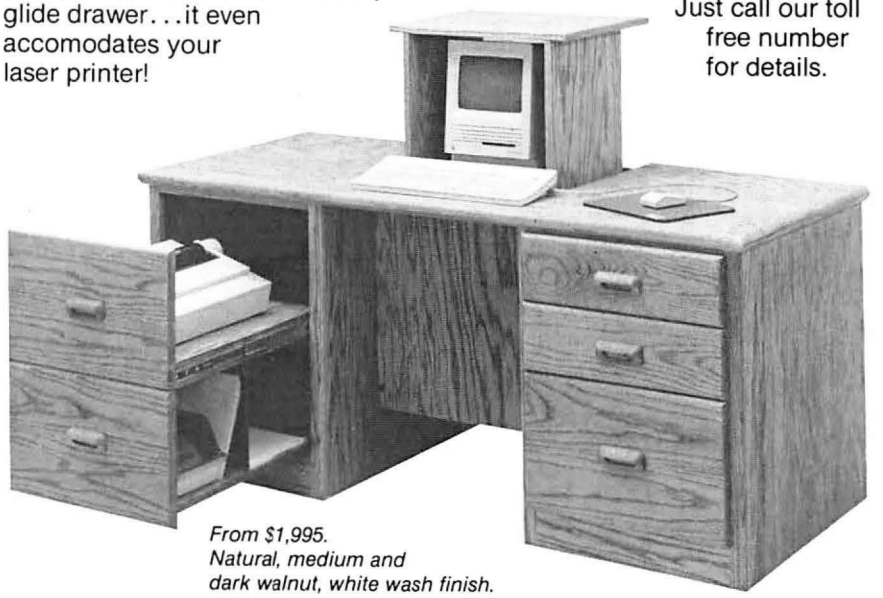
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The Media Lab's body-tracking suit, worn here by director Nicholas Negroponte; hand and body movements are immediately reflected onscreen.

ments helped set the agenda for the study of multimedia at the Media Lab.

"When we gave the lab a name in 1980, we had to agonize over it," says Negroponte. "Of all the words in the English language, 'media' has such terrible connotations. In Webster's, it's positive. It means 'channels of communication.' But in general, when you say media, people mean mass media, one-way communication. It has a Madison Avenue tone, a kind of lowest common denominator to it. We mean the opposite of all those things." Interactivity is central to Negroponte's thinking about multimedia.

The Media Lab divides its labors between the study of computers in education (the work of Seymour Papert), the development of media technologies, and the human-machine interface. The projects are legion, and the latter two categories are "deeply intertwingled," to use Ted Nelson's phrase. Projects include: computers that can read your lips and eyes; touch screens and touch-sensitive world globes showing a wide range of geographical and geophysical display — the obverse side of the data-glove concept; phones that recognize the voices of your friends through voice-pattern recognition; electronic musicians that can jam with you by learning your style; and a large, Sesame Street–like fuzzy interface named Noobie, with a computer in his belly, that children can embrace — part of Alan Kay's Vivarium project.

In one of MIT's sensor projects, Negroponte wears his own version of punk black attire: a full-body, optical-tracking suit. The goal is to make computers sensitive to the nuances of human gesture. Infrared LEDs on the suit's gloves and joints permit optical tracking of the wearer's motion. With the use of such techniques (see "Audible Motion"), computers can be taught highly complex human move-



ments, an endeavor that will have profound effects on the development of such things as computer animation, human agency, and robotics — anatomical research that formerly required painstaking studies in calculus and structural anatomy.

On the technology side of things is an early, impressive interactive multimedia project that is now a standard demo at the Media Lab: NewsPeek. In this project, an electronic newspaper culls its information from daily newspapers, TV news broadcasts, and online data banks like NEXIS. Using a touch screen, you can zoom in on a topic and have illustrations come to life in full-color newsreels culled from TV. In the ideal NewsPeek project, a key piece of artificial intelligence was to be built in: The newspaper learned about your tastes, helping you sort out the big, buzzing confusion of random world news.

THE MAN IN THE MACHINE

"What needs to be articulated, regardless of the format of the man-machine relationship, is the goal of humanism through machines," says Negroponte.

To some, that sounds like a prescription for *Brave New World*. Key results, however, point in the direction of making the computer transparent and more accessible to a wide variety of human agendas. In Alan Kay's Vivarium project, children are taught what it means to develop a complex ecosystem, with significant implications for understanding how children learn as well as for ecology. In Papert's Hennigan School project in Boston, inner-city children (of whom 40 percent are black, 40 percent are Hispanic, 18 percent are white, and 2 percent are Asian) are exposed to computers on a daily basis. The result is that children are learning advanced computer, mechanical, and musical concepts at an early age. — MICHAEL MILEY

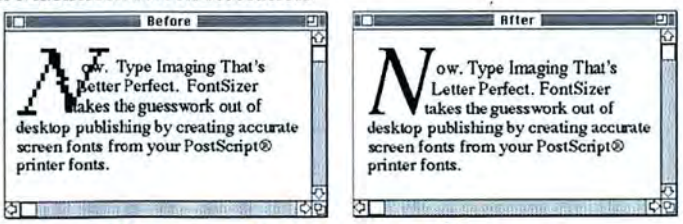
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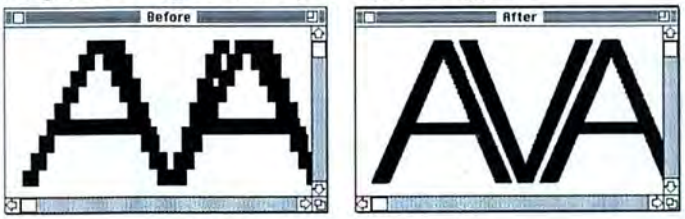
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Making the Jump to Hypermedia

Ted Nelson's contention that filmmakers are best equipped to deal with the demands of multimedia isn't as off-the-wall as it might sound.

Just a few miles north of Ted's houseboat, a major film company has already taken up the challenge. In close collaboration with Apple, Lucasfilm, creator of the *Star Wars* and *Indiana Jones* movies, has begun work on several educational projects under the aegis of the company's Games Division.

In the past, companies using HyperCard have created data-driven stacks that control a videodisc player, essentially providing HyperCard annotation to videodisc-based visuals. The Lucasfilm projects are pushing the envelope by blending the company's experience in filmmaking and entertainment with interactive multimedia. Steve Arnold, general manager of Lucasfilm's Games Division, describes the company's approach:

"We believe that the combination of technology with the principles of good storytelling and the addition of engaging entertainment dimensions will make for some really exciting and fascinating educational projects. They must engage today's very media-literate kids, who aren't as easily hooked by a teacher standing in front of a blackboard."

To achieve that emotional engagement, Lucasfilm's designers are incorporating many familiar cinematic techniques. For example, a HyperCard flip-book animation on the Mac screen moves off the Mac monitor to continue on the video monitor — only this time it's live video, not animation. Custom highlighting simplifies button arrays, and sound effects as well as multiple soundtracks are used to create a new educational medium.

Because this medium is interdisciplinary and Lucasfilm is at heart a production company, creating multimedia projects has presented new challenges — beginning with assembling a design team. "We've not only collaborated with Apple and their folks at the Multimedia Lab, but we've also gathered together the expertise of our own organization in interactive design, software programming, art, music, film production, and post-production," Arnold says. "We also needed expertise in the subject area. So one of the real lessons that we've learned is how you structure a project like this. We've learned how to assemble an interactive production team to go along with a linear production project and get the material that we need to do an interesting, engaging, interactive piece. We can see how to supplement something that's being shot conventionally — either a film or a television show."

The challenges extend beyond the software itself. There are hardware considerations as well. Since Lucasfilm's creations are designed for off-the-shelf components, the designers have had to make sure that the videodisc-player drivers and features built into the stacks are compatible with as many videodisc players as possible. Then there's the video material itself. Lucasfilm's projects have been created in conjunction with organizations like the Smithsonian Institution and the National Audobon Society that contribute not only their knowledge of a given subject but also the requisite archival images and film or video footage. So the multimedia process is not only interdisciplinary — it's also interindustry.

INTERACTIVE SINGULAR

The irony of all this cross-industry cooperation, however, is that the cur-

Life Story, shown below, is a joint creation of the Apple media lab, Lucasfilm, and the Smithsonian.



ED KASHI

rent state of multimedia still limits interactivity to a single individual working with a single system. Arnold sees this as a limitation that has to be overcome. "In order to make these things work in the classroom," he says, "they've got to work in all three formats: as an individual workstation, a presentation system for a class, and a small-group activity, so that a small group of students can sit together and do a particular thing. So one of our design philosophies is to figure out ways to let hypermedia do all those things better and better. The interface problem is a significant one when you're asking people to make inquiries — and you want a system that responds. We've been playing around with principles of remote control, for instance, so that this could be something that a group of people could do in a classroom, rather than one person sitting down with a mouse." But since Lucasfilm is creating projects with off-the-shelf components and is not about to enter the hardware business, any new interface devices are likely to come out of some future alliance with Apple and videodisc-player manufacturers.



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MEANING OR NOTHINGNESS

As the Lucasfilm team continues developing interactive multimedia projects, two concepts remain foremost in Arnold's mind: significance and accessibility. Unlike game design, where irrelevancies are intentionally inserted as part of the fun, effective multimedia projects can be seriously damaged if the material presented isn't entirely cogent. "Interactivity has to be meaningful to the user in order to be worth being there," Arnold says. "Choices which aren't significant are not intrinsically valuable. And to the extent that designers are thinking about hypermedia, the watchword is make sure the choices you give them matter." Arnold believes that meaningful choices increase emotional involvement, which in turn makes the experience more resonant.

And just as in moviemaking, where the goal is to persuade the audience that the images on the screen are real, the multimedia designer's goal is to make the presentation accessible while keeping the technology invisible. "We want you to have a good, engaging media experience and not get hung up on the fact that a computer is delivering it," Arnold explains. "If people can forget about how the presentation is getting there — you know, it's Alan Kay's thing about making the technology transparent — and just be engaged by what they hear, what they see, what they feel, and what they can do, in relation to the presentation, then we've done a good job." — RUSSELL ITO

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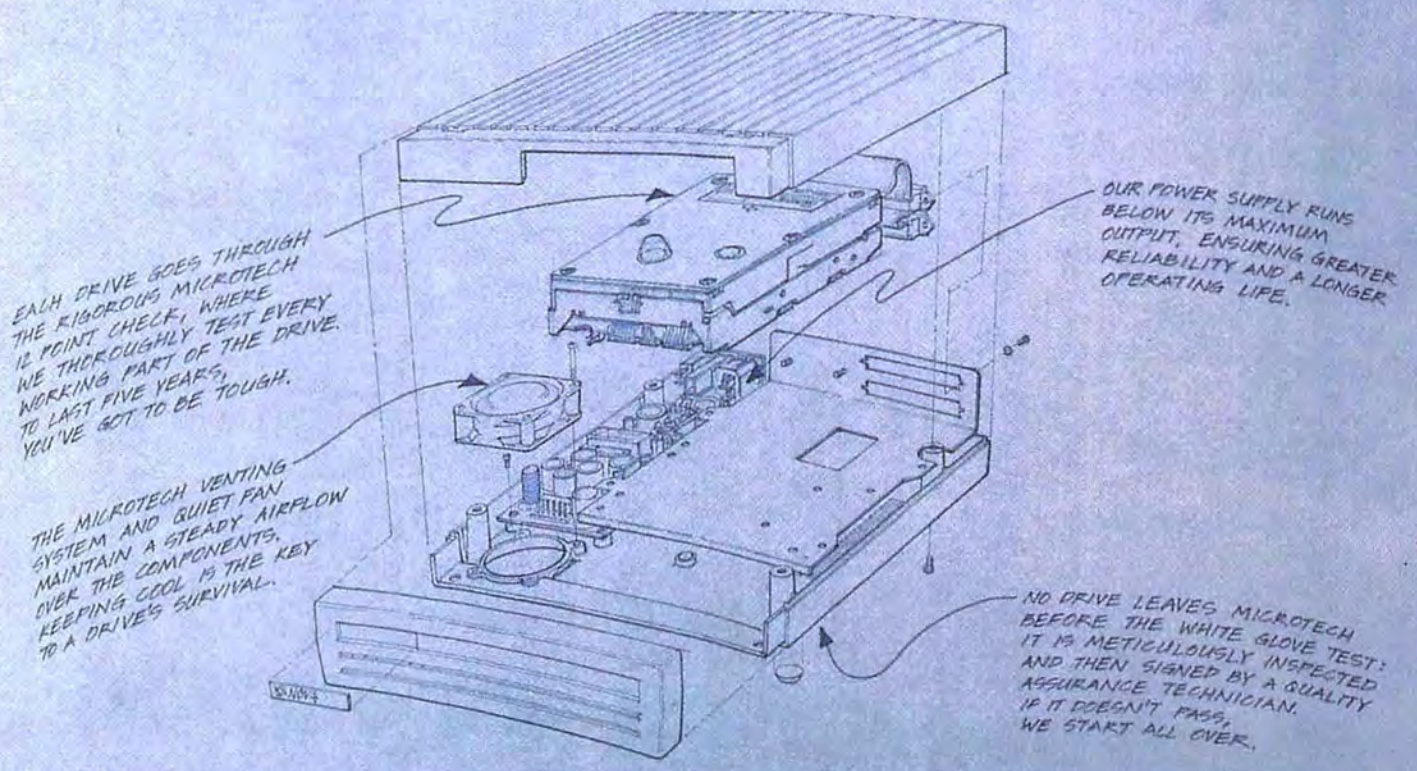
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The Future:

Toward a Knowledge Navigator

Let's review. We've tried in the preceding pages to dust the hype off of hypermedia. We've made a conscious effort to avoid pronouncement, to remain enthusiastic yet skeptical, and to stick to concrete examples of multimedia potentials as they are, as opposed to as they will be some day real soon now.

We kept our feet on the ground.

Meanwhile we've asserted that the development of multimedia potentials will move ahead hand in hand with the development of the human interface.

Now perhaps you'll forgive us as we gather the implications of our assertions, extend their flaps, open up our throttle and lift multimedia off the runway.

SOAR SPOT

We have spoken more than once of a coming convergence of technologies: Body tracking, for one, will extend our reach literally into the computer. Data gloves will allow us to feel as if we are actually manipulating screen objects in three dimensions. Eye-tracking devices will anticipate the sphere in which we wish to act, perhaps automatically activating whichever window we look at. Other human input devices will aid health and fitness.

New 3-D technologies will provide stereoscopic views of 3-D shapes. Today there is a 3-D laser disc system capable of interfacing with the Macintosh by means of liquid crystal shutter eyeglasses that separate left- from right-eye views. New delivery systems will provide 3-D images without the need for special glasses.

HIS MASTER'S VOICE

Voice recognition is destined to change the way we interface with computers even more dramatically than the advent of the mouse has. With some add-on hardware, even today a Mac can be "trained" to do some of the things we'd like to have it do by "listening" to our instructions. When it is working smoothly, the primitive voice interface of today is as much of a revelation as that legendary first encounter with a Macintosh was.

In the future your computer will be able to respond to hundreds of individually programmed responses, throughout every application you run. A unidirectional microphone will listen for voice commands and act accordingly. Voice input will not render the mouse obsolete, but rather augment its use. Together they can form a powerful team.

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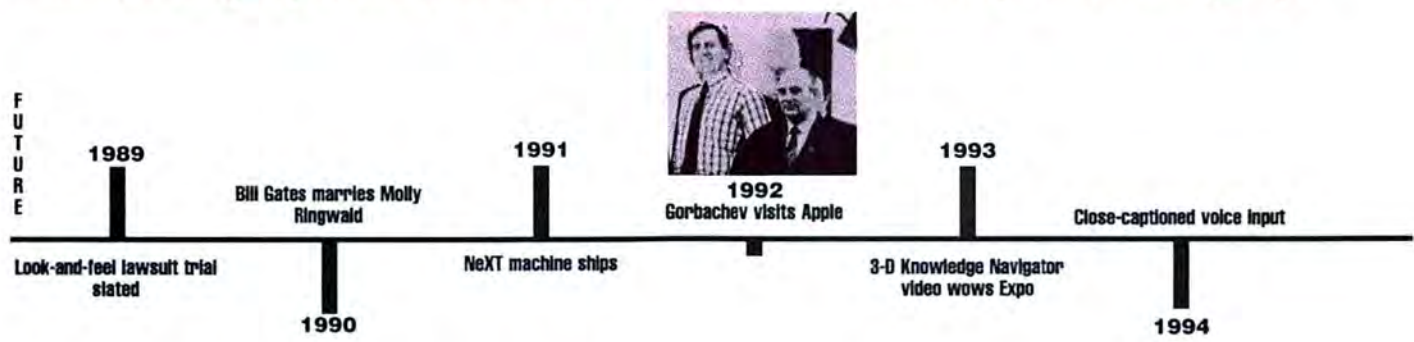
Working in tandem with voice input will be the concept of the anthropomorphic software agent or guide. This is a simulated secretary, librarian, and teacher, seemingly living inside your computer. It would talk and listen to you and then act for you at your behest. Such an agent would be a kind of artificially intelligent alter ego, a software reflection of its user, knowing something of your style, your interests, and your work habits. It could learn to guess the kind of information you need to complete a project and respond intelligently to your desires, almost before you've expressed them.

Developing an effective software agent isn't just a matter of improving artificial intelligence technology. It means taking advantage of a brand-new discipline called *knowledge engineering*: a craft situated at the location where computer science, the social sciences, and artificial intelligence converge.

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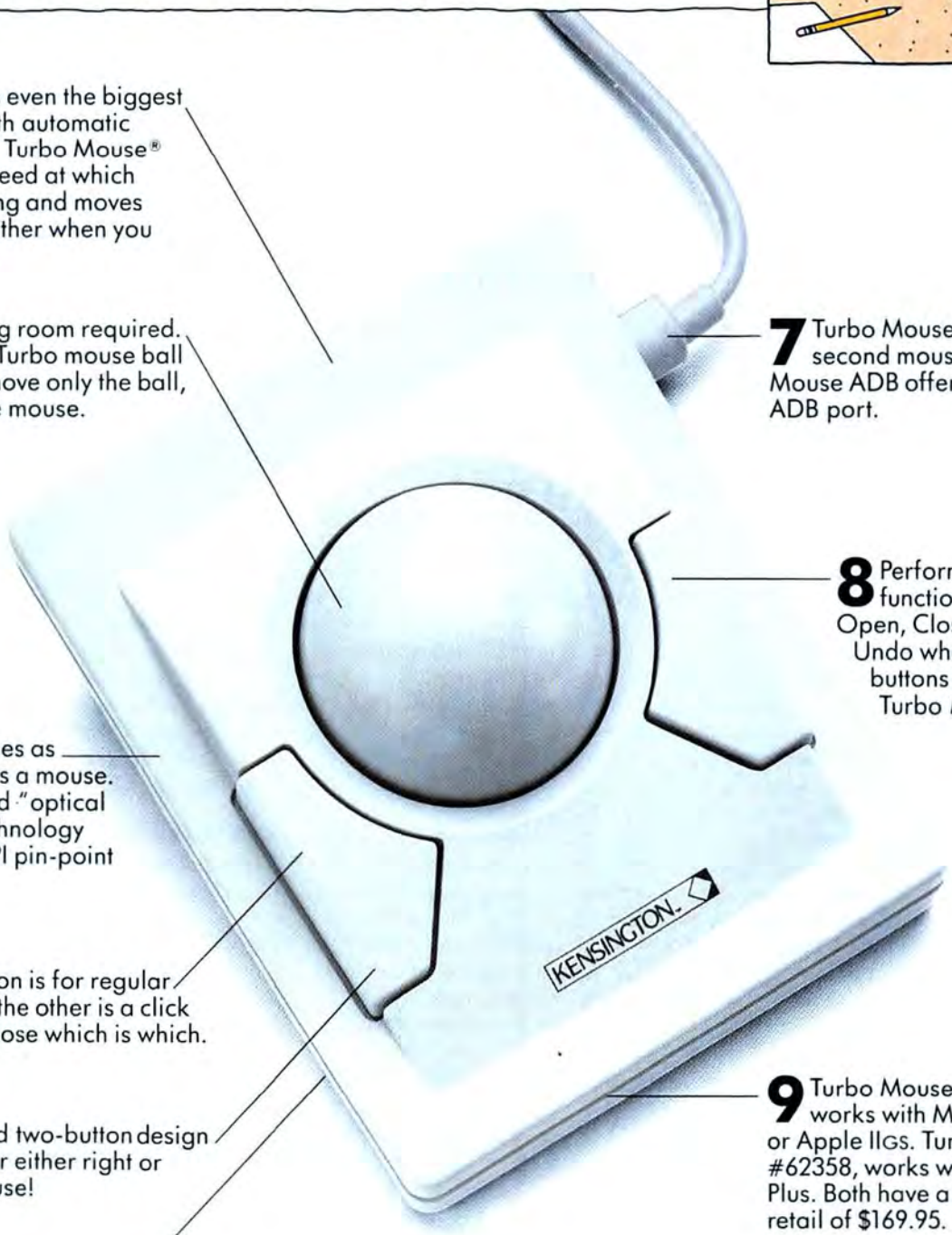
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agent will be cooperative partners, working together creatively to solve problems and accomplish tasks, even as the nature of those tasks evolves. You will be engaged in an ongoing conversation with the "person" in your computer, each of you able to interrupt the other, make suggestions, and ask questions.

You will tailor your agent to suit your tastes; your agent will attempt to tailor itself to accomplish the same. You will have the impression of being able to access information from a vast and apparently seamless source of data and applications. Wherever possible, you will have the opportunity to make meaningful choices from a range of possibilities. The agent's job will be to narrow down the alternatives so that your decision really can be meaningful and intelligent.

NO MORE BLIND DATA

With such a tool, a user will have gained an engine for transforming information into knowledge.

Apple CEO John Sculley, in his autobiography, *Odyssey* (Harper & Row, 1987), said, "A future generation Macintosh, which we should have early in the twenty-first century, might well be a wonderful fantasy machine called the Knowledge Navigator, a discoverer of worlds, a tool as galvanizing as the printing press. Individuals could use it to drive through libraries, museums, databases, or institutional archives. This tool wouldn't just take you to the doorstep of these great resources as sophisticated computers do now; it would take you deep inside its secrets, interpreting and explaining — converting vast quantities of information into personalized and understandable knowledge."

Miniaturization will likely act to transform the Mac by the time these developments take hold. The Knowledge Navigator might be a console interface to your home entertainment center, a small package the size of today's electronic calculators, or it might look like a high-tech pair of sunglasses. It might even be entirely invisible to you, small enough to be sewn into your clothing, or it could simply be a part of the furniture.

It will matter less what the Knowledge Navigator looks like than what it does. And while predicting the future is always risky, it's a good bet that today's Macintosh will seem like an antique cathedral radio next to the slim, intelligent computing engines of the early 21st century.

The Knowledge Navigator will leave the desktop metaphor far behind, and you will be multitasking almost all the time without even being aware of it. The key aspect of the operating system and its interface will be seamlessness.

You'll work within a single and apparently simple computing environment without any artificial distinction between one application and another. You will work in multiple windows simultaneously, on various tasks, with any number of tools readily at hand for developing still or animated graphics, creating and processing documents, or tapping into a text or visual database on the other side of the world.

You will be able to browse through enormous and rich databases, making your own personal links between disparate pieces of information. You'll be able to customize any aspect of your computer environment easily. Your machine will also be capable of acting as a media processor, letting you assemble multimedia smoothly from any source format.

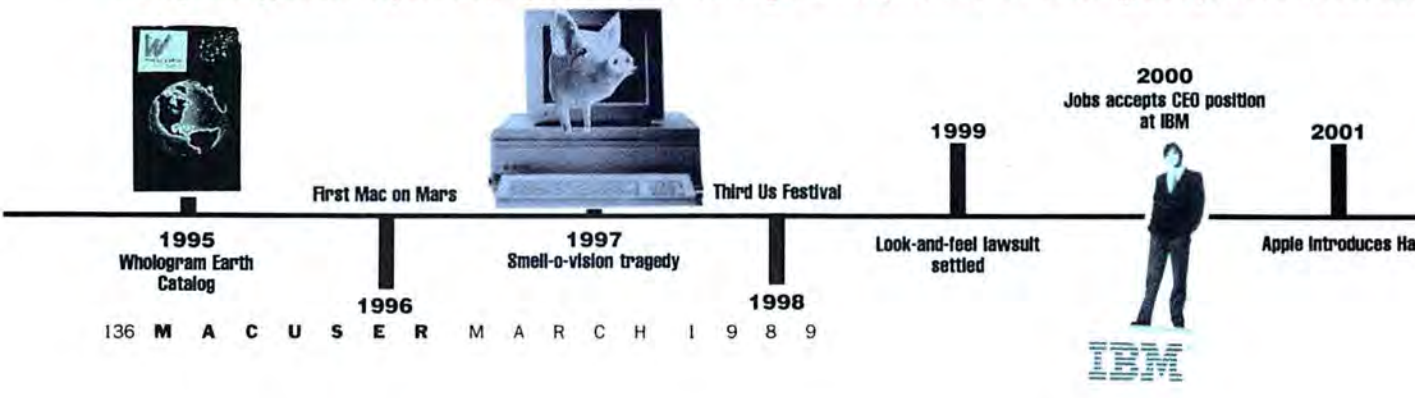
MIS-SING PIECES

It will take some rather sophisticated hardware to make all this happen. The first major piece of the hardware puzzle is processing speed. In order to access large amounts of information very quickly — a requirement for any truly interactive computer — you need a very fast clock: at least as fast as a 1989-vintage supercomputer. And in order to respond very quickly to what you, the user, want to do from second to second, the Knowledge Navigator will need a very wide bandwidth (bandwidth is the size of the electronic pipe through which information is pumped; the wider the bandwidth, the more information per second you can pump into the system, and the fuller the reservoir you have to work with).

The Knowledge Navigator will likely be a parallel processing, or *transputer*-based computer. In other words, instead of having a single microprocessor, or CPU, that runs the whole processing show and does all the work itself, a future computer will have a number of parallel chips, or transputers, that divide the processing tasks among themselves and thereby get the work done a lot faster. An interesting by-product of transputer architecture is that when you increase the number of processors working on a calculation, you also multiply the computer's bandwidth: with four processors instead of one, you can bring four times as much information into the system at the same time — likely a basic requirement for the multimedia workstation of the future.

One result of this stride will be the potential for a real-time full-motion interface. Among the possibilities here is a flight simulator that uses real-time, photographic, full-motion video but which is entirely under your con-

through the hype and irresponsible prognostication surrounding it. While speculation is interesting, a skeptical view is advised.



trol. Another is an animated cartoon in which your agent is a real-time, active participant. In addition to making information come out of the screen, in other words, you'll be able to climb in as well.

The last piece of the hardware puzzle is storage media — a large, safe place to keep all that information, to access it quickly, and to be able to change it at will. The solution will probably be a supercompact, large-capacity, optical read/write/erasable drive — a technological descendant of the magneto-optical drives recently announced by various makers. Unfortunately the AppleCD SC will be ancient history by the time this piece of the puzzle is in place. Throughput on CD-audio–based technology as it stands is simply too slow for the kind of ante we're postulating here. And the need to rewrite is obvious. Once this piece of technology exists, you won't need a laser disc player to store video images and sound anymore. Any medium you can represent digitally can be stored on the one source.

THUMBING YOUR KNOWS

The most magnificent (and possibly ironic) facet of the promise of Knowledge Navigator is that by the time it arrives, the computer may finally have replaced the opposable thumb as the greatest influence on the development of the human brain. By that time, we likely won't use the word computer anymore. And we probably won't think of the Knowledge Navigator as something we use. We'll think of it simply as something we do.

— ANDREW HIMES AND JOHN J. ANDERSON

Kudos

THE MACUSER FEATURES STAFF WOULD LIKE TO THANK THE FOLLOWING PEOPLE FOR THEIR INVALUABLE CONTRIBUTIONS TO THIS PACKAGE: ELIZABETH HASLAM, PH.D, SENIOR INSTRUCTIONAL DESIGNER FOR THE SOFTWARE DEVELOPER REALITY TECHNOLOGIES AND ASSOCIATE PROFESSOR AT DREXEL UNIVERSITY. ANDREW HIMES, MAC FUTURIST AND EDITOR OF THE FONDLY REMEMBERED MAC HORIZONS MAGAZINE. TONY REVEAUX, A SAN FRANCISCO–BASED WRITER AND CONSULTANT, EDITOR OF COMPUTER PUBLICITY NEWS, COLUMNIST FOR COMPUTER CURRENTS, AND CONTRIBUTING EDITOR FOR ARTWEEK.

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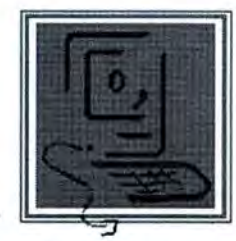
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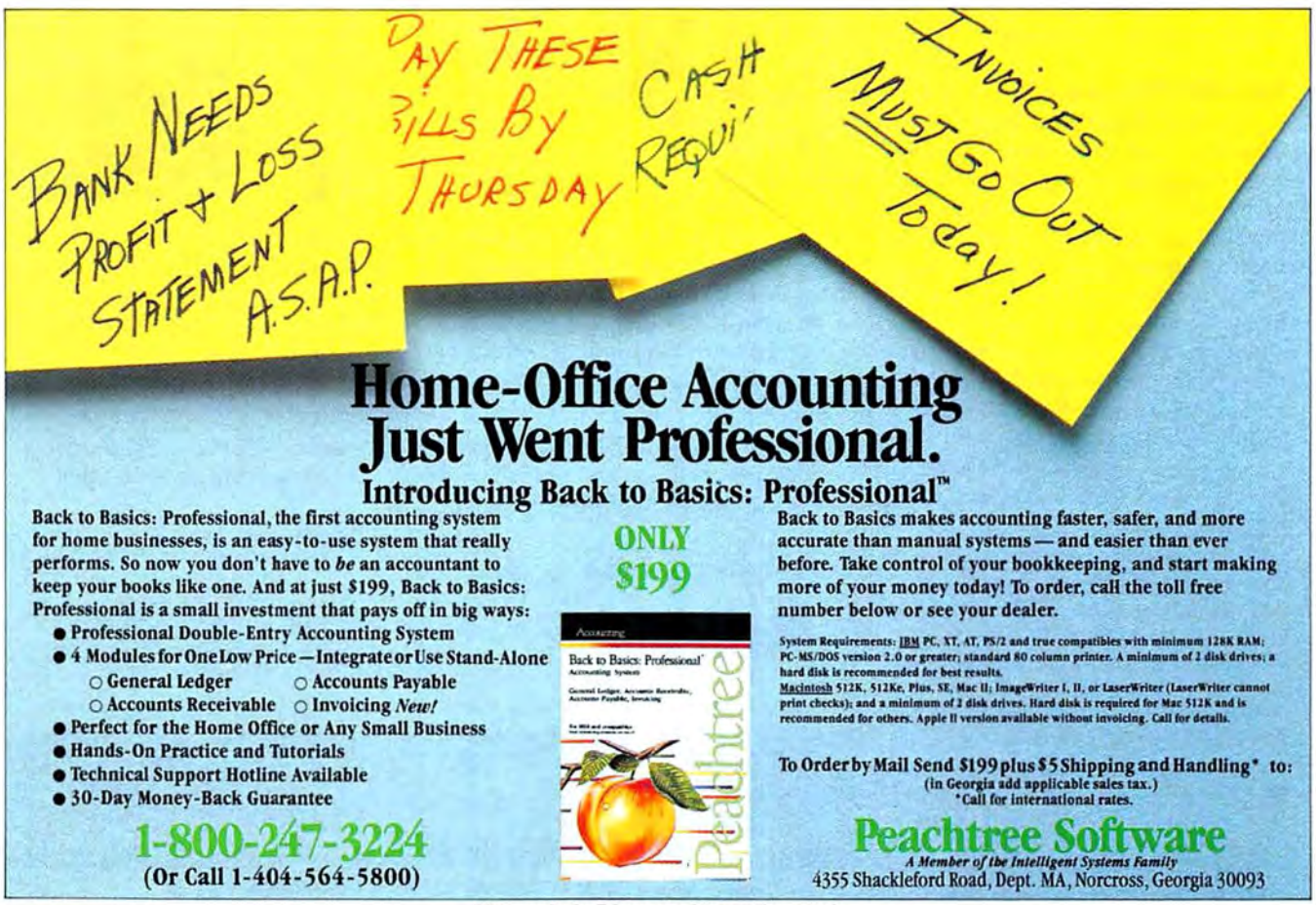
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A primer on courseware development.

CD-I and Interactive Videodisc Technology
Edited by Steve Lambert and Jane Sallis
Howard W. Sams
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Copyright 1987; $24.95
An overview of interactive videodisc (IVD) and compact disc–interactive (CD-I) technology.

CD-ROM: The New Papyrus
Microsoft Press
16011 N.E. 30th Way
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Thoughts from the leaders in the field of optical technology.

The Complete HyperCard Handbook
By Danny Goodman
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666 Fifth Ave.
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Standard reference work for anyone interested in stack design.

Designing Interactive Software
By Greg Kearsley and Robin Hally
Park Row Press
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Copyright 1985; $19.95
An introduction to the design principles underlying interactive programs.

Human Interface Guidelines: Apple Desktop Interface
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HyperCard Developer's Guide
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HyperCard Script Language Guide
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Copyright 1988; $22.95
Apple's official guide to HyperTalk.

HyperCard Scripting: A HyperTalk Language Guide and Tutorial
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Computer Co-op Books
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A tutorial guide to HyperTalk programming.

Advanced Interactive Video Design
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Learning Tomorrow: Multimedia in Education
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The editor of the ***Whole Earth Catalog*** focuses his sights on MIT's Media Lab and its research into future technologies.

XCMDs for HyperCard
By Gary Bond
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The Connection Machine

When the Model T Ford first came out, there was an article in *The London Times* that said something like, "Well, there goes the neighborhood. How are we going to survive when every member of society is going to have to spend so much time learning how this thing works?" Society had not yet created the filters to buffer itself from the overwhelming impact of its technology. Now that we have the filters — like garage mechanics and diagnostic centers, in the case of the automobile — we can drive our cars without worrying too much about how they work.

The filters and buffers for the information age are the kinds of hypermedia systems discussed in this issue. They provide ways in which we can go on expanding human knowledge but at the same time prevent it from overwhelming us or leaving us isolated or totally ignorant because we don't happen to have a doctorate in a particular subject.

It's all Descartes' fault. He gave us the reductionist way of dealing with information and fragmented knowledge beyond anybody's grasp. The Renaissance man is long gone, but with things like HyperCard applications and expert systems, there's a chance we can pull ourselves out of the avalanche of fragments of information and survive.

When I was a little kid, I used to play a game with the encyclopedias. I'd look up something and see what it linked to. Then I'd look that up and see what that linked to — from Aristotle to the trajectory of cannon balls, from cannon balls to the Eniac computer developed for ballistics calculations — pretty soon I'd find myself after five o'clock with my mother asking if I'd done my homework. That's how powerful hypermedia can be.

Everything links to everything else. If you don't believe it, try a little experiment. Take a thesaurus (like Word Finder on the Mac, or *Roget's* in the old-fashioned paper edition). Pick any two words at random — like *horse* and *rotate* — and see how long it takes to chain from the first to the second, using a trail of synonyms. From *horse* to *nag* ("an old horse"), from *nag* (as in "pester") to *ride* (as in "ride roughshod"), from *ride* (as in "go for a ride") to *spin* ("take it for a spin"), and on to *rotate*. Only four links in this particular chain.

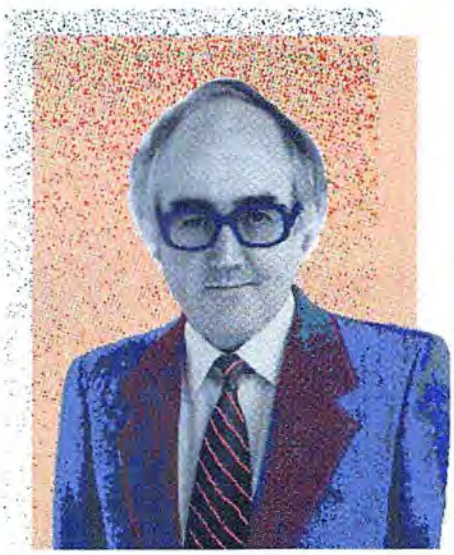
If we could ever plumb the depths of language, it would create an altogether new type of human-computer interface. But natural language is such a gigantic problem that even those geniuses up at MIT are beginning to say, "Well, maybe not just yet."

If you try to work out even what simple statements apparently mean or could mean, or the number of ways somebody could mean something by a relatively simple statement, you realize how unbelievably vast the phenomenon of natural language is. If I say "Johnny got some new toys today. He was opening the box when you came in," there's absolutely nothing in that statement to tell you what "the box" is, but you know with absolute certainty what I mean.

Where's the data? It's not there — and yet it is.

Or suppose I ask you: "What does *mother* mean?" Put this magazine down and think about what that word is. Well, I'd be waiting until next year; the semantic linkages could stop anybody in their tracks. If we could tap into *that*, it would be really exciting. That would be Interactive Multimedia with a capital *I* and a capital *M*. And it ought to be possible.

But for the moment, natural language lies outside the reach of computers. Which is why the Mac's flexible blend of language, graphics, and spatial interactiveness is so important in harnessing the power of hypermedia. Whichever side of your brain is in charge, at least one of those two sides — the spatial, holistic right brain or the linear, analytical left brain — is going to be all right with the Mac.



By James Burke

James Burke is a renowned historian of science and technology who has produced such BBC television series as "Connections" and "The Day the Universe Changed." He was also, until his recent acquisition of a Mac Plus, one of the few but proud owners of an Apple III. This article is based on excerpts from an interview with Senior Editor Jon Zilber.

The Shaman's Laptop

Actually, icon-based computing devices are nothing new. In fact, they may have played a role in humans' evolutionary transformation from Neanderthal to Homo sapiens. Paleontologists have unearthed bones and antlers on which very small carvings have been made. These artifacts date back more than 30,000 years. The earliest ones had *meanders* — wiggly parallel lines with apparently ritualistic meaning. Between 30,000 and 15,000 B.C., the meanders gave way to much more sophisticated systems of notation.

One such artifact, called the Montgaudier Baton, has what appears to be a calendar from March to November, the months between the thaw and the freeze when you could get out of the cave. It also has a number of carvings of salmon and seal. For a

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time, no one could figure out why there would be salmon and seal in Montgaudier, a hundred miles from the sea. Then they looked closely at the salmon carvings; they were tiny little things, and the shape of the fish showed that they were in the spawning stage. And, of course, in spawning they come up the rivers. The seals chase them up the rivers, so that's how somebody 100 miles from the sea saw salmon.

And 30,000 chronological years and a light-year of culture away, we can make sense of the user-friendly Montgaudier Baton, even without a manual.

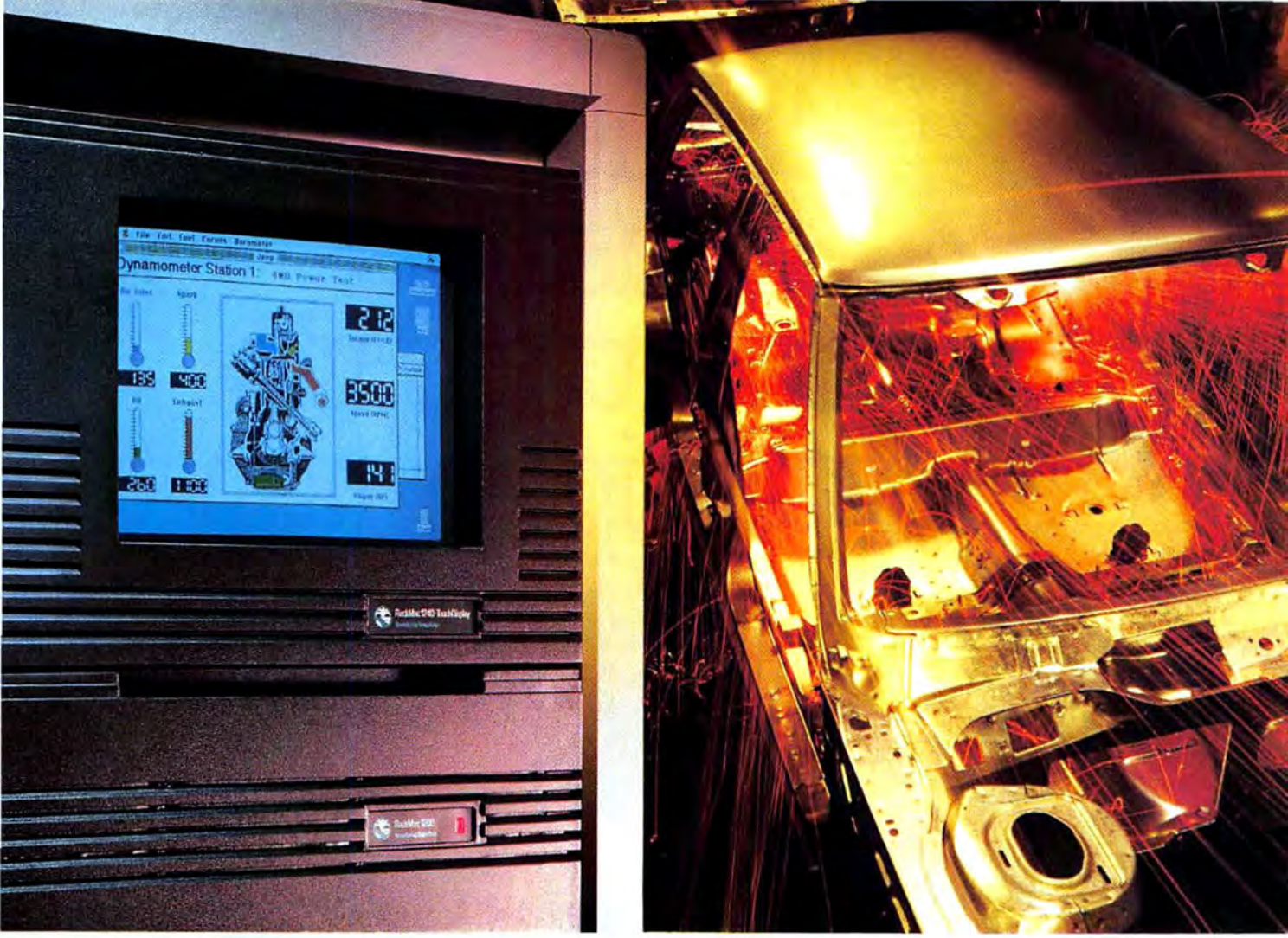
These devices made it possible to hunt more efficiently and to tell others of the capabilities they had. So they survived because they could communicate in a more complex way. They could also say, "The next time the moon comes up, fellows, that's when we go out and get the salmon." That way you eat salmon instead of berries. Next week, caviar.

These extraordinary devices are the closest thing you can get to proof that Homo sapiens had arrived. They indicate a cognitive ability on par with the modern brain. In other words, Homo sapiens had come and displaced Neanderthal because of greater cognitive abilities.

The disappearance of Neanderthals suggests a parable for modern people. There's a place in Israel where Neanderthals and Homo sapiens apparently lived close enough together to breed, but they didn't. Homo sapiens were clearly different from Neanderthal. Homo sapiens' linguistic and cognitive abilities allowed them to pass on their knowledge culturally through the use of language. The Neanderthals weren't grunting apes: They had rituals that indicated their belief in life after death, they took care of the young, and they paved their own hearths against damage by fire. But they were superseded by a species that was better equipped to store, communicate, and use information to help it withstand the hazards of life in the Ice Age.

Back to the Present

Unless we begin to make some urgently needed changes in our educational



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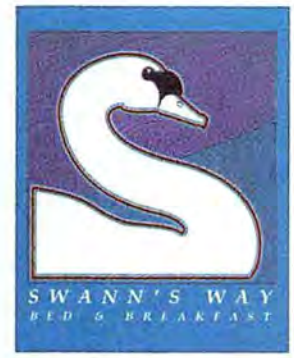
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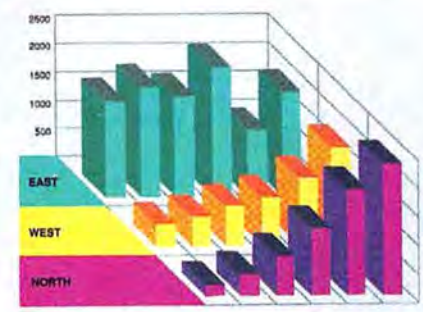
For information on the QMS ColorScript 100, including print samples, a complete list of compatible software and information on financing, call 1-800-631-2692, ext. 203.





Pictured are just some of the ways designers are using the QMS ColorScript 100. The creative director at one design firm notes: "We're doing comps in minutes that used to take hours. The quality is fantastic." A computer design system manager in the Midwest says: "Our clients are getting more options, in less time, at lower costs."





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systems, we'll be heading towards a similar split between two classes of society: the information-rich and information-poor. Even well-intended efforts to teach children to write computer programs are absurdly going about things in the wrongest possible way.

Imagine if in Gutenberg's time we had been teaching children to typeset instead of to read, and yet here we are doing just that. Computer-program–writing skills will soon be as unnecessary as printing skills. Even though there are already programs that write programs, we're still treating computers as if they were things for which people should learn to write programs, instead of learning to demand of them what people demanded of books when they came out. And I believe that the coming revolution in multimedia computing is going to make what happened with Gutenberg look like nothing.

Technologies of Freedom

For educators, the potential of interactive video working together with HyperCard is a very exciting thing. The job of the educational system up until now, it seems to me, has been to *fail* people, not to educate them. Fail the majority so you can teach a few. Society simply has not been able to do more than that because it hasn't had the tools and systems to do much more than what they did in the Middle Ages: Teach a few people and fail the majority.

In modern times, the majority aren't failed in the sense of receiving failing grades; they've been failed in the sense of not being encouraged to live up to their potential. I have this utopian dream that is born of the fact that neurophysiologically we are all about equal. We all have, give or take, a hundred billion neurons in there, and unless we have some kind of disease or other defect, most of us have roughly the same kind of brain that Einstein had.

Hypermedia systems could enhance, liberate, and augment human intellect, act as releasers and facilitators of what people already have in their heads. But first we've got to develop the hardware and software and get this stuff into the

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classrooms as soon as possible, and give these webs of ideas to children and just say "play." Think of the freedom it's going to give teachers to indulge in a Socratic dialogue and stop wasting everyone's time putting junk data — which is out of date before it can be used — into their students' heads.

The need for education goes beyond the traditional classroom. In the near future, we're all going to have to recycle our knowledge about every 10 years to keep up with our jobs. There is a colossal pool of talent lying around out there in everybody's brains that we have not been able to make socially valuable use of until now, thanks to the communications and information-processing tools that the late Ithiel de Sola Pool described as the "technologies of freedom."

To keep up, we'll have to recycle our knowledge every 10 years.

Hypermedia will also have an impact on larger sociopolitical structures. These changes could be more massive than anything in history. Back in the late 1960s, I interviewed the man who ran the Soviet space effort. At one point, he said, "I have a nightmare," and he used a term that we would now call a personal computer. That was his nightmare, because once the technologies of freedom start to leak, you can't get them back in the bag.

Could a monolithic state structure withstand hypermedia? I doubt it. It invites too much thinking. It invites too much dissent, because that's precisely what it's for. It says, "See what you can think of. See how many ways you can go."

Until modern times, the evolution of life on the planet — including humans — was driven by our ability to cope with and exploit the energy and natural resources around us: to adapt to the environment, create tools, and perpetuate the species. In the future, the ability to navigate and use *information* will be the hallmark and future of humankind.

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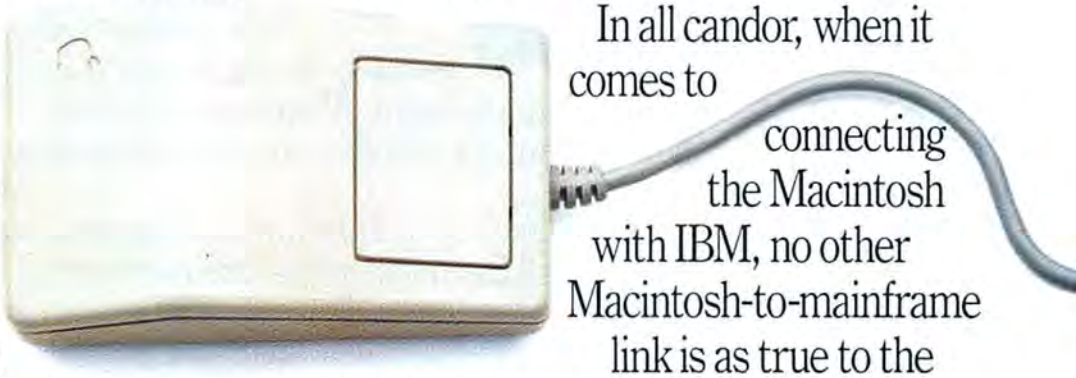
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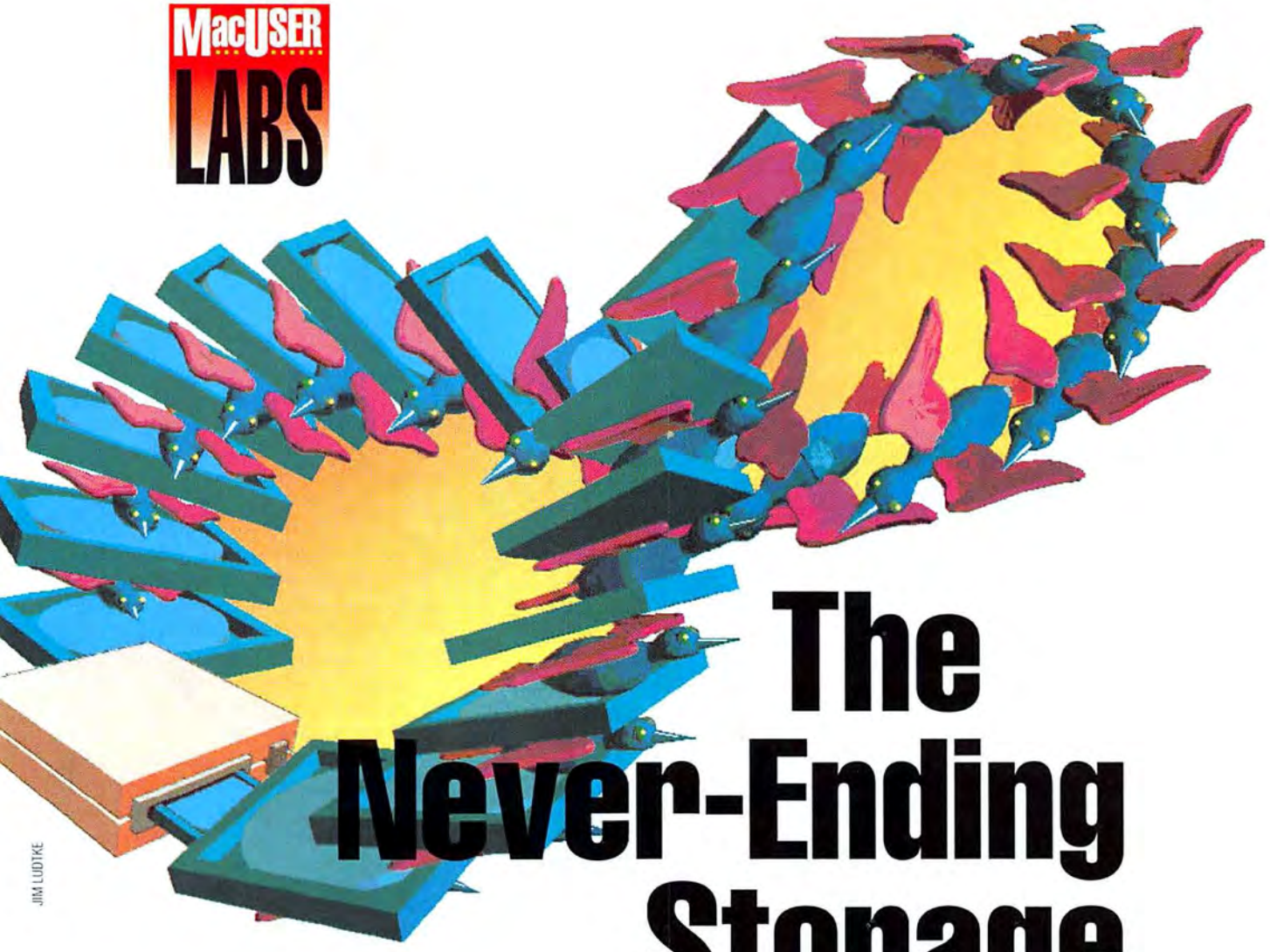
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and the MacUser Labs Staff

"Disk full."

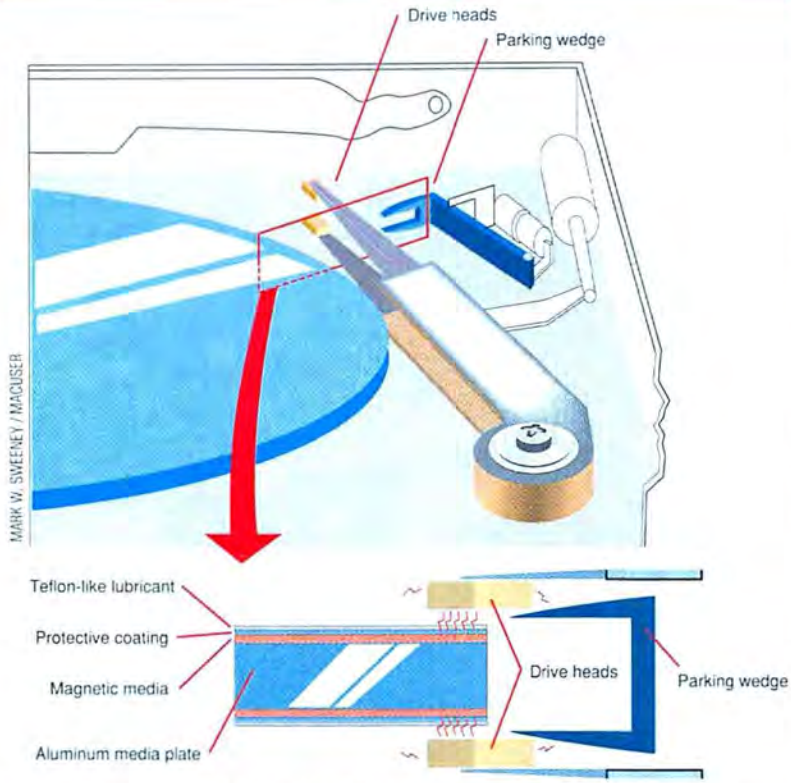
The words stare at you obscenely, like a party joke scribbled on a restroom wall. You're sure it must be a fluke, a technical glitch, an enigmatic hobgoblin. You haven't seen that dreaded message since you bought a 40-megabyte hard-disk drive two years ago. No — it couldn't possibly be!

Could it?

A quick check with the Finder confirms your frenzied panic: Your hard disk has runneth over; its tank is topped off; it has posted the ultimate "No Vacancy" sign in the Lost Land of Mammoth Megabytes.

Time to buy another hard-disk drive? Whoa there. Think twice before you take the plunge. If you managed to top off one hard-disk drive, you're likely to fill another, then another, and another....

Removable Hard Cartridge Head-Parking Mechanism



Removable hard-cartridge drive heads can't contact disk when parked.

Wouldn't it be nice if you could just eject the full disk and pop in a fresh, blank one? That's exactly the idea behind the removable mass-storage drive. You needn't be a data glutton to appreciate removable mass storage. You may share gobs of computer-aided design or spreadsheet data with coworkers or clients, and instead of shipping a horde of floppy disks around the country, you can trade one compact and easily transplanted high-capacity disk.

You'll also appreciate removable mass storage if you deal in sensitive data, like plans for the Stealth Bomber — stuff you don't want falling into anyone else's hands. Or if you need a quick and effective way to back up one or more fixed (nonremovable) hard-disk drives.

MacUser Labs subjected 17 removable mass-storage drives to exhaustive and comprehensive tests. (The removable mass storage we're extolling here is the random-access, fully recordable and erasable kind. It doesn't include streaming tape, CD-ROM, or write-once, read-many (WORM) drives.) Though many of the models share common traits and specifications, there are marked and unexpected differences.

What's more, removable mass-storage drives use three distinct technologies, and each has its pros and cons. You must first choose a technology, and then decide on the best model in that group. You'll want to weigh all the factors carefully before making an investment.

DUELING FORMATS

At a very basic level, a removable mass-storage drive is like a hard-disk drive but with one important difference: You can remove and replace the magnetic recording disk. The catch is that some removable mass-storage drives use flexible disks instead of "hard" ones, and others are engineered so that you remove the entire drive mechanism from a central chassis unit. Removable mass-storage drives use three basic technologies to pack portable megabytes:

• *High-capacity flexible drives* use a floppy disk enclosed in a vinyl or hard-plastic shell. They're similar to the floppy-disk drive already installed in your Mac, but the recording medium is bigger and the disk holds at least 12 times as much data.

• *Removable hard-cartridge drives* are the most like conventional hard-disk drives but with a twist. Press a button, and the hard-disk platter ejects from the drive. The platter is enclosed in a hard-plastic cartridge for protection.

• *Removable hard-disk drives* use self-contained, modular hard-disk mechanisms that can be removed from a host chassis. The chassis contains the controller electronics (which communicate with the Macintosh) and a power supply.

A fourth pseudoremovable mass-storage drive is the compact, shock-mounted model. These are orthodox hard-disk drives that — because of their small size and weight — offer many of the same advantages and capabilities as removable mass storage. We've dubbed these units *totables*. For more information about these diminutive drivettes, see sidebar, "Totable Hard-Disk Drives."

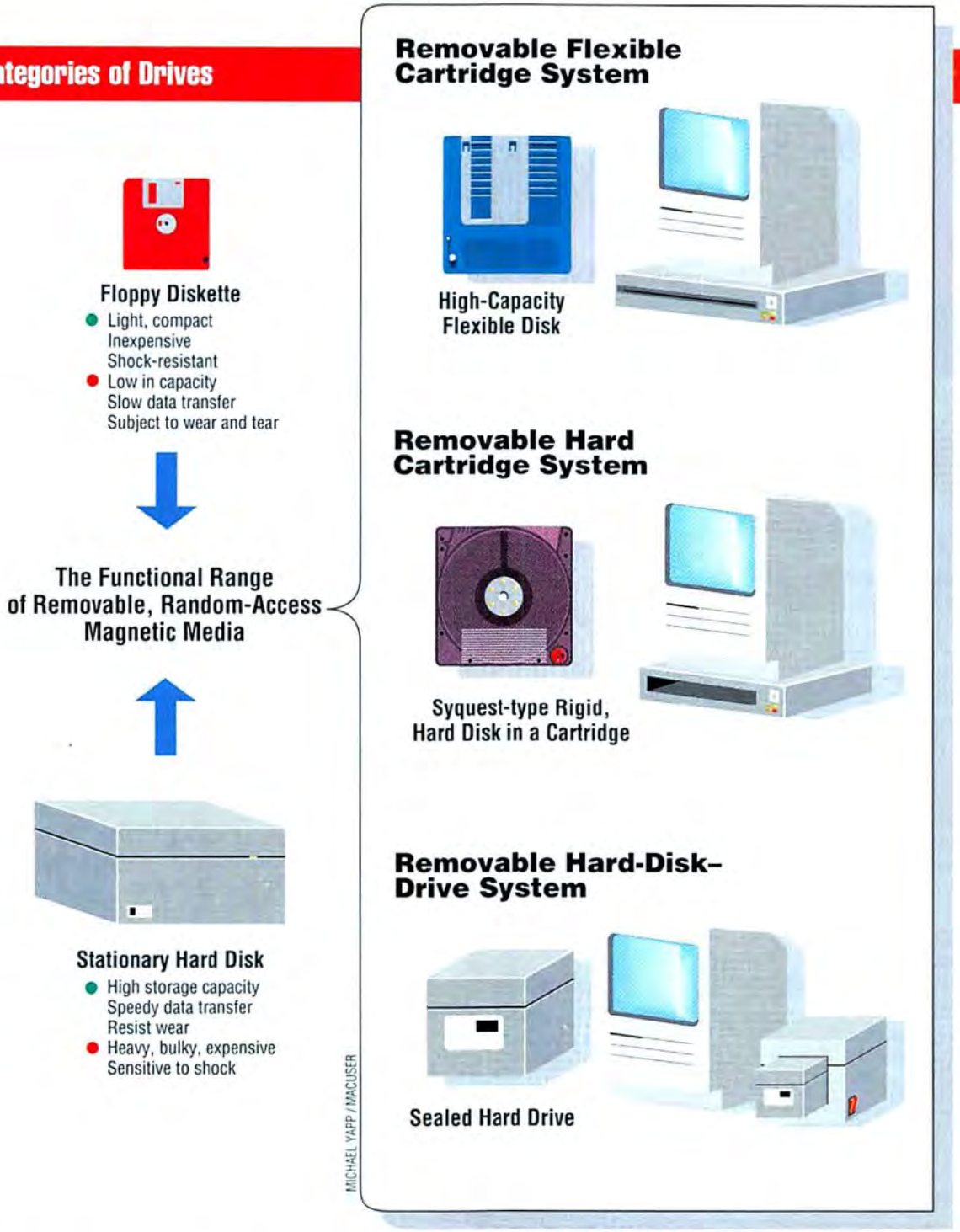
WHAT GOES ON INSIDE

Regardless of the actual system used to implement removable high-capacity data storage, the 17 contenders in this Lab Report conform to the same basic data-recording techniques shared by all computer disk drives.

A disk, coated with a magnetically sensitive layer, spins at high speed inside the drive. A magnetic pickup head, similar to the recording heads in a tape deck but much smaller, contacts or hovers over the disk medium as it spins. Data is recorded in discrete circular tracks, and each track is further divided into sectors. By partitioning the disk into distinct track and sector domains, the Macintosh is able to store and retrieve data more efficiently. Note that each concentric track begins and ends at the same place; the read/write head does not record a single, long track that spirals from the outside of the disk to the inside like a phonograph record.

Conventional hard-disk drives for the Macintosh and other computers often use

Categories of Drives



more than one recording disk to store large amounts of data. Except for the Bernoulli Box II/20 and the removable hard-disk drives, the models detailed in the following pages use a single disk. This disk may be single- or double-sided; when double-sided, the drive has two read/write heads, each positioned on one side of the disk.

HIGH-CAPACITY FLEXIBLE DRIVES

Can a floppy disk really hold 20 megabytes or more of data? You bet. The Mac's floppy-disk drive uses a *stepper motor* to inch the read/write head over the surface of the disk. Though stepper motors are reasonably accurate, they move only in discrete *steps:* finite increments that limit the number of recordable tracks. The fewer the tracks, the lower the capacity. High-capacity flexible drives use a

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- Tape Stack 60 MB Tape Back up 675

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- MacSnap 524S 369
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- MacSnap 548E 532
- MacSnap 548S 586
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- MacSnap 2S 429
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- SCSI Interface/Port 119
- MacSnap Toolkit 15

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- Bernoulli Dual 10 MB 1,520
- Bernoulli Dual 20, 5.25 MB .. 1,765

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- Rodime 45 Plus 874
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- Rodime 1000 RX INT 955
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- Mac 40 MB Tape Back Up 909

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Capsule Reviews

High-Capacity Flexible Drives



PETER GOULD / MACUSER

The high-capacity flexible drives (clockwise starting at lower left): the RM20, the Bernoulli II/20, the Totem, the Bernoulli Box (bottom), the MegaDrive 20, the XP 60+B, and the Infinity 10.

Infinity 10

A 10-megabyte 5.25-inch floppy-disk drive. Can also read both 360K and 1.2-megabyte IBM disks. Unfortunately, it can't write files to an IBM format. **Pros:** Very low cost per megabyte. **Cons:** Slower than traditional hard-disk technology.

Peripheral Land, Inc.
47800 Westinghouse Drive
Fremont, CA 94538
(415) 657-2211
Drive, $1,195
Disk, $25.

MegaDrive 20

Codeveloped by Data Technology Company (DTC) and Kodak/Verbatim. Stores 20 megabytes on a 5.25-inch floppy disk. **Pros:** Comes bundled with lots of good software like Symantec Utilities for Macintosh, Redux, and DEScryptor. Low cost per megabyte for cartridges. **Cons:** Much slower than conventional hard disks. Only one source for obtaining disks.

Jasmine Technologies, Inc.
1740 Army St.
San Francisco, CA 94124
(415) 282-1111
Drive, $999
Cartridge, $83

RM20

Uses the same DTC drive as the Jasmine MegaDrive 20, although it costs $100 less. Bundled software isn't as good as Jasmine's. **Pros:** A bit faster than the Jasmine drive. Prompt and knowledgeable technical support. Attractive case. **Cons:** Much slower than conventional hard disks. Only one source for obtaining disks.

Mirror Technologies
2644 Patton Road
Roseville, MN 55113
(612) 633-4450
Drive, $899
Cartridge, $56

Bernoulli Box

Original Iomega Bernoulli Box, first marketed in 1982. Has since sold many thousands, mostly for the PC. **Pros:** Very reliable, proven technology. Interchangeable with IBM cartridges and compatible with A/UX. **Cons:** Bulky chassis and cartridges. Slow.

Iomega Corp.
1821 W. 4000 South
Roy, UT 84067
(800) 777-6654
Single drive, $1,999
Cartridge, $125 (20 megabytes)

Bernoulli Box II/20

Same Bernoulli technology but much smaller than its predecessor. **Pros:** Very reliable and "crash-proof" technology. File interchangeability with IBM Ber-

sophisticated closed-loop servo system to position the read/write head accurately over the surface of the disk. The head is mounted on a voice-coil actuator that can position the head anywhere along the radius of the disk. High-frequency servo signals are recorded by a precision formatter at the factory when the disk is made. This ensures that the head stops directly on each track.

Without these servo signals, which are not erased even when the disk is reinitialized, the drive won't work. That's why you should never use a bulk eraser on a high-capacity flexible disk. The process will destroy it. This warning applies to all the high-capacity–drive media discussed in this report because all of them use closed-loop servo systems.

The high-capacity flexible drive category is actually composed of two technologies: Bernoulli and high-density floppy. Let's look closely at each one.

BERNOULLI DRIVES

Bernoulli drives use an 8- or 5.25-inch flexible disk enclosed in a hard-plastic cartridge. The cartridge slips into the drive like an audiocassette into a car's tape player. Once the cartridge is inside the drive, its protective doors open and reveal the disk.

Bernoulli drives derive their name from Daniel Bernoulli (1700–1782), a Swiss physicist who developed a complex aerodynamic principle involving fluid pressures and velocities. Very simply put, the Bernoulli principle states that when the velocity of a fluid (including air) increases, its pressure decreases. It is the Bernoulli principle that accounts for the ability of an airplane to fly.

The flexible disk in a Bernoulli drive spins at 1,500 to 1,800 rpm, depending on the drive type (traditional hard-disk drives spin at 3,600 rpm). This spinning induces a stream of air to move over the surface of the disk. As that air passes over the tiny magnetic read/write head, the air molecules speed up slightly (just as air speeds up when it passes over the top of an

noullis. Comes with A/UX formatter that enables you to partition the drive as an A/UX volume. **Cons:** Cartridges can't be removed if drive is turned off. Without new driver, software speed on the Mac II is slower than with the original Bernoulli (beta version of the new driver software speeds it up dramatically, though).

Iomega Corp.
1821 W. 4000 South
Roy, UT 84067
(800) 777-6654
Single drive, $1,650
Cartridge, $83

Bernoulli Box II/44

This is a preproduction unit due to be released by March '89. Bernoulli technology with high capacity and fast access times makes this drive a major contender. **Pros:** Low cost per megabyte, same Bernoulli reliability. **Cons:** Can't read 20-megabyte Bernoulli cartridges. No IBM interchangeability yet, though planned for the future.

Iomega Corp.
1821 W. 4000 South
Roy, UT 84067
(800) 777-6654
Single drive, $1,999
Cartridge, $125

Totem

Another 20-megabyte Bernoulli drive, with a lower price than Iomega's. Bering Industries is owned by Mountain Computer, which was just acquired by Nakamichi (of high-end audio fame). Dual unit has drives stacked on top of each other, rather than side by side as in Iomega. **Pros:** Virtually the same drive as Iomega's but cheaper and faster. **Cons:** Cartridges can't be removed with power off.

Bering Industries, Inc.
240 Hacienda Ave.
Campbell, CA
95008-6687
(408) 379-6900
Drive, $1,295
Cartridge, $85

SuperMac XP 60+B

Combination Dataframe 60-megabyte hard-disk drive and one Bernoulli drive. Superior driver software allows it to outperform other Bernoullis. **Pros:** Comes bundled with lots of good software: spooler, encryptor, and backup utility. **Cons:** Rather expensive because of hard-disk drive. If you need a hard-disk drive, it's worth it.

SuperMac Technology
295 N. Bernardo
Mountain View, CA
94043
(415) 964-8884
Drive, $3,495
Cartridge, $80

airplane wing). According to the Bernoulli principle, air pressure therefore decreases, and the disk is drawn to — but does not touch — the magnetic head.

The disk flexes slightly as it passes over the head, which contributes to some wear of the media over time. Most Bernoulli drive manufacturers estimate media life of five years, a reasonably long period considering the inconstancy of computer data.

Though it is separated from the disk by a distance of less than 10 millionths of an inch, the head still becomes dirty after several dozen hours of use and requires a thorough cleaning. Most Bernoulli drives come with cleaning kits. The biggest selling point of Bernoulli drives is their relative immunity to head crashes. A crash occurs in hard-disk drives when the magnetic head touches the delicate surface of the disk. In a Bernoulli drive, air pressure prevents the head from touching the disk. Even if the drive is turned off and the disk comes to a stop, the media floats away from the head as the lift pressures are relieved.

The champion of Bernoulli mass storage is Iomega, holder of the Bernoulli-drive patents. It currently offers three drives:

- The original Bernoulli Box, designed for 8-inch media that can store either 10 or 20 megabytes.
- The Bernoulli Box II/20, engineered for 5.25-inch media and capable of a 20-megabyte reserve on its two cartridge-encased disks.
- The Bernoulli Box II/44, which has 5.25-inch media and a 44-megabyte storage capacity. We tested a preproduction unit, and it looked very promising.

Other Bernoulli models are the SuperMac Technology XP 60+B, a combination 60-megabyte fixed and 20-megabyte Bernoulli removable drive, and the Bering Industries Totem, with a 20-megabyte capacity. Both the SuperMac and the Bering use disks compatible with the Bernoulli Box II/20.

Users of Bernoullis maintain an almost fanatical devotion to their drives, and they eagerly jump to the defense at the first sign of adverse comment. Nevertheless, we found that the Bernoulli drives were among the slowest and most expensive in the crowd. In our Macintosh SE DiskBasher tests, all the Bernoulli drives we evaluated ranked 50 to 200 percent slower than competing removable hard-cartridge or removable hard-disk drives. Much of this slowness can be attributed to the disk speed of 1,500 to 1,800 rpm. The slow rotation limits disk performance; after all, the head can retrieve data only as fast as the disk can shuttle it by.

As an example of performance, the Bernoulli II/20 had a MacUser Labs DiskBasher benchmark speed of 96.6 seconds on the SE. The Mass Microsystems DataPak, typical of the removable hard-cartridge units, boasted a speed of just 45.2 seconds, more than 50 percent faster.

If Bernoulli technology is somewhat slower than that of rival systems (and new II/44 driver software speeds performance considerably), its reliability is unmatched. Yes, the flexible media in Bernoulli drives eventually wear out, but head crashes are infrequent to nonexistent. You can always anticipate the wear of a Bernoulli cartridge in time to replace it with another. But you never know when the next head crash will occur. For this reason alone, the Bernoulli drives are worthy of your consideration.

HIGH-DENSITY FLOPPIES

High-density floppy-disk drives pack

Table 1: Main Summary of Features with Benchmark Results

	High-capacity flexible disk					
Available removable disks	**Bernoulli Box** Iomega	**Bernoulli Box II/20** Iomega	**Bernoulli Box II/44** Iomega	**Infinity 10** Peripheral Land	**MegaDrive 20** JasmineTechnologies	**RM20** Mirror Technologies
Nominal capacity	20 Mb	20 Mb	44 Mb	10 Mb	20 Mb	20 Mb
Suggested retail price	$125	$83	$125	$25	$58.33	$56.33
Cost per megabyte	$6.30	$4.20	$2.80	$2.50	$2.90	$2.80
Compatible competing chassis	none	XP 60+B, Totem	none	none	RM20	MegaDrive 20
Lab-tested removable disks						
Nominal capacity	20 Mb	20 Mb	44 Mb	10 Mb	20 Mb	20 Mb
Finder capacity of disk in Labs test	20.5 Mb	20.5 Mb	42.8 Mb	10.3 Mb	19.3 Mb	19.3 Mb
Dimensions L x W x H (in.)	11 x 8.5 x 0.75	5.25 x 5.25 x 0.4	5.25 x 5.25 x 0.4	5.25 x 5.25 x 0.07	5.25 x 5.25 x 0.2	5.25 x 5.25 x 0.2
Weight without carrying case (lb)	1.1	0.2	0.2	0.02	0.12	0.12
Shock rating claimed (without carry case)	1,000 G	1,000 G	1,000 G	1,000 G	1,000 G	1,000 G
DiskBasher benchmark on SE (sec)	236	96.6	58.3	104.36	74.7	74.7
DiskBasher benchmark on Mac II (sec)	97.5	108.4	75.3	102.86	197.3	161.5
Duplicate a 6-Mb file on SE (sec)	141.7	105	79.2	N/A	305.1	303.8
Duplicate a 6-Mb file on Mac II (sec)	109.2	110.1	84.3	N/A	271	226.1
The stationary chassis						
List price for 1 port	$1,650 ∞	$1,999 ∞	$1,999 ∞	$1,195 ∞	$999	$899
List price for 2 ports	$2,550 ∞	$2,499 ∞	$2,999 ∞	—	—	—
Dimensions L x W x H (in.)	16.0 x 12.5 x 6.25	15.0 x 14.0 x 3.25	15.0 x 14.0 x 3.25	10 x 9.6 x 3.25	10.5 x 9.6 x 2.5	10.0 x 10.0 x 2.75
Security	no	no	no	no	no	no
Indicator for mounted disk/read-write activity	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes
SCSI terminator	external; provided	internal	internal	internal	internal	internal

∞ Manufacturer claims this will be available in the future.
∞∞ Cartridges ship in packages of three for $175 (for MegaDrive 20).

Glossary

access time — The amount of time from when a hard disk receives a "retrieve data" command to when the data is actually fetched and delivered.

automatic park — A system whereby the heads of a hard-disk drive return to a safe area after a certain amount of time or after the drive is powered down.

cache — A hardware or software method of temporarily storing data retrieved from a hard-disk drive. The cache retains copies of the data most recently retrieved from the disk — either in a reserved portion of the Mac's RAM or in RAM located within hard-disk–drive controller electronics. If the data stored in the cache is needed again, it is recovered from the cache rather than from the drive. This speeds up drive operation, in some cases quite substantially.

controller — An electronic circuit that directs the specific operations of a hard-disk drive. On the Macintosh, controllers are built into drives themselves.

data encoding — Any one of several techniques used to record and later play back data on a hard-disk drive. The encoding technique greatly influences the amount of data that can be stored on the disk, and it also partly determines the reliability of the recording. Popular approaches include *MFM* and *RLL* (see those entries).

head — That part of a hard-disk drive that records data on the magnetic surface of the disk, then reads it back again. Many hard-disk drives have two or more heads. Because the heads in a hard-disk drive are used to both record and play back computer data, they are often referred to as *read/write heads*.

MFM — An acronym for "modified frequency modulation" recording, the recording technique used by most older Macintosh hard-disk drives.

microsecond — One millionth of a second.

millisecond — One thousandth of a second.

park — A process whereby the read/write heads of a hard-disk drive are placed in a "safe" area on the surface of the disk so that, if the heads contact the disk, little or no important data will be lost.

		Removable hard-disk drive, stationary chassis			Rigid disk in cartridge
XP 60+B SuperMac Technology	**Totem** Bering Industries	**Disk Pack P84** MegaDrive Systems	**TransPac** ProStor	**UniPak** Mass Microsystems	**6 removable hard cartridges** 6 VARs. Syquest is OEM.
20 Mb	20 Mb	21 Mb, 42 Mb, 84 Mb, 125 Mb, (200 Mb *)	32 Mb, 42 Mb, 84 Mb,100 Mb, 200 Mb	48 Mb, 84 Mb, 102 Mb	44 Mb
$80	$85	$899, $1,299, $1,699, N/A, N/A	$1,095, $1,565, $2,230, $2,450, $4,950	$1,200, $1,800, $2,600	$110–$195 each
$4	$4.30	$42.8, $30.9, $20.2	$34.2, $37.2, $26.5, $24.5, $24.8	$25.0, $21.4, $25.5	$2.5 - $4.6
Bernoulli Box II/20, Totem	XP 60+B, Bernoulli Box II/20	none	UniPak	TransPac	All Syquest 44-based systems
20 Mb	20 Mb	84 Mb	84 Mb	102 Mb	44 Mb
20.5 Mb	20.5 Mb	80.7 Mb	80.7 Mb	100.8 Mb	42.6 Mb
5.25 x 5.25 x 0.4	5.25 x 5.25 x 0.4	7.3 x 4.3 x 2.0	8.1 x 4.6 x 1.7	8 x 4.5 x 1.8	5.375 x 5.375 x 0.4
0.2	0.2	2.3	2.3	2.3	0.4
1,000 G	1,000 G	150 G	60 G	75 G	30-in. drop to concrete
73.1	155.2	37.6	37.9	41.8	45.2–48.8
72.5	65.55	27.84	27.5	30.6	38.6–38.8
105.7	182.2	56.23	57.35	58.9	57.7–82.5
101.9	91.9	33.75	40.89	43.9	45.2–48.8
$3,495 ∞ ¥¥	—	— *	$285	$600	($1,199–$1,799) ∞
—	$1,295 ∞	$799	—	— ¥	—
9.5 x 5.0 x 8.0	10.5 x 9.75 x 5.25	9.8 x 6.0 x 5.5	9.7 x 9.6 x 4.25	9.625 x 9.625 x 2.75	see Table 2
no	no	no *	yes	no *	no
yes/yes	yes/yes	yes/yes	yes/no *	yes/yes	yes/yes
internal	internal	external; provided	external; provided	internal	internal

¥ In addition to the UniPak, Mass Microsystems markets the Duet, which has one hard-disk–drive port and one hard-cartridge port.
¥¥ The SuperMac chassis also houses a 60-Mb nonremovable hard drive.
∞ Prices for these chassis include one free cartridge per port.

plated media — Magnetic media used in hard-disk drives. Very thin layers of metal alloys are laminated to make a high-quality and durable recording surface. Plated media offer an increase in data capacity and reliability over the older iron-oxide coatings.

platter — The actual recording disk in a hard-disk drive.

RLL — An acronym for "run-length-limited" recording, an enhanced recording technique that packs 25 to 50 percent more information on the same size disks as the older MFM technique.

SCSI — An acronym for "small computer system interface," the interface used on the Macintosh to connect to hard-disk drives and other types of input/output peripherals.

seek time — The average time for the read/write heads to move from one track and lock onto another track.

servo positioning — A system found in some hard-disk drives (particularly the removable mass-storage type) whereby special signals previously recorded on the disk aid in accurately positioning drive heads for read/write operations.

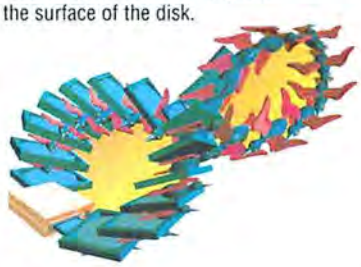
stepper motor — A type of motor that moves in discrete steps instead of complete revolutions.

track — A collection of sectors spaced in a circular pattern on the surface of the disk.

track-to-track access — The average time for the read/write heads to move between adjacent tracks.

transfer rate — The amount of information, usually expressed in kilobits or megabits, that can be passed between one device and another in one second.

voice coil — A coil-and-magnet apparatus used in hard drives to position the read/write heads accurately over the surface of the disk.



In Focus

Removable Hard-Cartridge Systems



PETER GOULD / MACUSER

The removable hard-cartridge drives (clockwise starting at lower left): the Mobile 42 Plus, the DPI 44 Removable, the 44RepackRemovable, the Infinity 40 Turbo, the DataPak (bottom), and the Info 42R.

If you've decided to buy a Syquest-type drive, you're in luck. Essentially the same drive engine is sold by a number of companies, so you get to concentrate on what might be most important to you: the price. Half a dozen companies buying from the same manufacturer have driven prices low. Nonetheless, there are differences between the systems.

What distinguishes one Syquest drive from another? Well, packaging for one thing. The Mass Microsystems unit has a nice ergonomic tilt that angles the screen of an SE more into your line of sight. DPI's drive chassis has a vertical mounting that looks good and fits nicely next to a Mac II. On the back of its model, Relax Technology has put additional AC plugs that are switched from the front. Each manufacturer builds in its own power supply. All the models reviewed use switching power supplies, and all have some form of surge and noise suppression. If the warranty is good, the power supply shouldn't be a major consideration.

The drivers appeared outwardly similar, and when test results came in, their performance was pretty much the same. Peripheral Land deserves mention for its caching scheme, which speeds data transfer considerably. But do you really trust a "write" cache where data to be written to the drive is actually stored in memory? Remember, if you lose power, you'll wave goodbye to that data.

Mass Microsystems includes Padlok software that performs encryption, formatting, partitioning, and password protection. Relax Technology includes a backup program, a formatter, and a desk accessory that lets you mount a new cartridge. DPI gives you a formatter — and not much else — while Bay Microsystems gives you FWB Software's Hard Disk Utilities and a formatter. Info Technologies does Bay Microsystems one better and offers all of FWB Software's programs, including a formatter.

After all is said and done, you may well ask if all the Syquest drives are equal. The answer is yes, basically. Therefore it seems that price, reputation, warranty, and the bundled software package should influence your decision. The most important of these considerations is probably price, closely followed by the vendor's reputation for service and support. While all the companies are relative newcomers, Relax and Peripheral Land have been in business the longest and that might give them the edge. However, since the guts of all these drives are basically the same, why not take a chance with a newcomer? We don't have a problem recommending any of these systems, and until magneto-optical (or something better) becomes a standard, we'll be using these as our removable medium.

more data in a given area than regular floppy-disk drives, thanks to their voice-coil–actuated read/write heads, precise closed-servo feedback system, and data-compression techniques. Rather than use the 3.5-inch media familiar to Mac users, high-density floppy-disk drives embrace the older but larger 5.25-inch format.

We reviewed two disparate high-density floppy-disk drive systems. One system, marketed by Jasmine and Mirror Technologies and developed in part by magnetic-media giant Verbatim, uses a 5.25-inch floppy disk packed inside a hard-plastic cartridge. Data capacity is a respectable 20 megabytes. The magnetic head touches the media, which spins at 600 rpm — roughly twice as fast as ordinary floppy disks. To prevent excessive wear on any one portion of the disk, the drive forces the head to roam over the surface of the media when not actually logging or fetching data.

Peripheral Land offers a high-capacity floppy-disk drive, the Infinity 10, that uses a flexible-vinyl outer jacket instead of a hard-plastic one. The disk looks exactly like the 5.25-inch floppy you'd use in an Apple II or IBM PC, but it holds 10 megabytes of Mac data. How? As with the other high-capacity floppy-disk drives, servo signals — previously recorded on the disk at the factory — are used to position the head accurately.

Because the Infinity 10 can accept regular 5.25-inch floppies, its dual personality allows it to read data recorded on IBM PC or PC/AT disks. Alas, it can't record data in PC format.

REMOVABLE HARD CARTRIDGES

Despite warnings of doom by competing manufacturers, the removable hard-cartridge, high-capacity drive has become the most popular of the bunch. Its engineering is deceptively simple but superbly workable: a rigid metal platter, coated with magnetic gunk, permanently housed

Table 2: Features of Removable Hard-Cartridge Drives

	DataPak Mass Microsystems	Mobile 42 Plus Relax Technology	DPI 44 Removable DPI	44Repack-Removable Bay Microsystems	Info 42R Info Technologies	Infinity 40 Turbo Peripheral Land
Suggested price for drive chassis	$1,799	$1,695	$1,595	$1,149 *	$1,199	$1,795
Suggested price for additional cartridge	$149	$195	$129	$108 *	$119	$149
Cost of each additional Mb of capacity	$3.5	$4.6	$3.0	$2.5	$3.5	$3.5
Lab-tested Finder capacity	42.6 Mb	42.6 Mb	42.6 Mb	42.6 Mb	42.6 Mb	42.6 Mb
DiskBasher benchmark on SE (sec)	45.2	46.2	48.8	45.8	45.8	45.3
DiskBasher benchmark on Mac II (sec)	38.6	38.7	38.7	38.8	38.8	38.6
Duplicate 6-Mb file on SE (sec)	69.5	69.4	95.5	70.3	70.3	69.6
Duplicate 6-Mb file on Mac II (sec)	58.3	57.7	82.5	58.6	58.6	59.3
Orientation of drive slot	horizontal	horizontal	vertical	horizontal	horizontal	horiz or vert
Dimensions L x W x H (in.)	10 x 10 x 3	13 x 10 x 3	12.5 x 3.5 x 6.5	10 x 9.5 x 3.5	10 x 9.5 x 3.5	10 x 10 x 2.5
Location of externally set SCSI switch	rear	rear	rear	front	front	rear
SCSI switch	push digital	DIP	rotary	rotary	rotary	rotary
SCSI connector	50-pin	DB-25	50-pin	50-pin	50-pin	50-pin
Circuit breaker or fuse	fuse	circuit breaker	nonaccessible fuse	fuse	fuse	fuse
Power indicator light	front	on power switches	none	front	front	none
Switched outlets	two on rear	four on rear	none	none	none	none
Power switch	rear	four, lighted on front	rear	front	front	rear
Miscellaneous **	Wedge shape can tilt Mac for easier viewing.	Outlet system is great. Rear outlets need labeling. Excellent manual.	System looks clean. Support is responsive.	Bulky appearance. Nice software.	Bulky appearance. Nice software.	Fast turbo-cache software. Useful option for vertical/horizontal orientation, but vertical wobbles.

* Bay Microsystems sells only directly to users.

** All manufacturers have a 1-year warranty.

Hard-Cartridge Drive Manufacturers

Bay Microsystems
210 Columbus Ave., Ste. 108
San Francisco, CA 94133
(415) 563-8392
44RepackRemovable

Mass Microsystems
550 Del Rey Ave.
Sunnyvale, CA 94086-3528
(408) 522-1200
DataPak

DPI
40 Corning Ave.
Milpitas, CA 95035
(408) 945-1850
(800) 825-1850
DPI 44 Removable

Peripheral Land, Inc.
47800 Westinghouse Dr.
Fremont, CA 94538
(415) 657-2211
Infinity 40 Turbo

Info Technologies
950 Taraval St.
San Francisco, CA 94116
(415) 753-1222
Info 42R

Relax Technology
3101 Whipple Rd, Ste. 22
Union City, CA 94587
(415) 471-6112
(800) 848-1313
Mobile 42 Plus

in a clear, hard-plastic cartridge. The 44-megabyte cartridge plugs into the drive mechanism, which includes one pair of read/write heads.

The recording platter in the cartridge is precision-polished aluminum, coated with layers of thin-film metal alloys for improved data capacity and material hardness. Over the thin-film coatings is a protective overcoat and a sheath of synthetic lubricant. The lubricant serves two purposes: to prevent serious damage if the heads should ever touch the surface of the disk and to prevent foreign matter from sticking to the surface of the media.

As in a regular hard-disk drive, the read/write head is levitated by a cushion of air above the 3,200-rpm spinning disk. The clearance, or *flying height*, between head and disk is exceptionally small, on the order of seven to nine millionths of an inch — just a fraction of the width of a human hair. The cushion of air normally prevents the head from touching the disk, but the cushion is lost when the disk stops spinning or when the drive is subjected to energetic movement. Removable hard-cartridge models are as susceptible to head crashes as ordinary fixed hard-disk drives, so they deserve the same care and consideration.

Removable hard-cartridge drives employ a locking system to prevent the heads from gouging into the disk when the cartridge is removed and inserted. When the drive is empty or turned off, the heads normally rest on a plastic wedge, located off to one corner. After the drive is turned on and a disk is inserted, the heads are nudged off the wedge and gently float over the surface of the spinning media. The drives also employ an automatic parking and locking system that is activated when the disk is ejected or when power is suddenly lost.

The removable hard-cartridge drive market is monopolized by Syquest, the manufacturer of both the disk cartridges

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Hyper Dialer ..... 29.
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Mactilt SE/512k/Plus ..... 72.
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Cabinet (Holds 45 Disks) ..... 19.
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Joystick (Quickstick) ADB ..... 39.
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Mac SE Bag Xt (Extended Keyboard) ..... 74.
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A+ Mouse ADB (SE/Mac II) ..... 85.
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Grappler Mac ..... 78.
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Macsnap 548 (512k To 2meg) ..... 575.
Macsnap 548e (512ke To 2meg) ..... 539.
Macsnap 548s (512ke To 2meg w/SCSI Port) ..... 598.
Marathon 020: Mse2 ..... 975.
Marathon 020: Mse3 ..... 774.
Marathon 020: Mse4 ..... 1154.
Plus 2 (2 Meg Upgrade, Plus Only) ..... 429.
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Daystar Digital
33/030 Accelerator II ..... 4680.
Novy Mac20mx-16mhz (SE/+) ..... 699.
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256k SIMM Module (120 Ns) .. CALL
2 One Megabyte Surface Mount SIMMs (120 Ns) ..... CALL
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Turbo 2400 EC Baud Modem ... 274.
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Of Drivers and Controllers



Macintosh disk drives — all kinds, removable and nonremovable — are virtually headache and hassle free, thanks to standardization in hardware and software. The typical Mac hard-disk drive is composed of three hardware components:

- The hard-disk mechanism itself, with disk platter, read/write heads, and motor.
- Controller electronics that provide both on-board smarts for the disk mechanism and a reliable connection to the Macintosh.
- A power supply to provide operating juice for the disk mechanism and electronics.

Controllers for Mac hard drives use a small computer system interface (SCSI) to connect the drive to the computer. The Mac has a matching SCSI interface; all you need is the right cable to connect the two. Mac hard drives use two types of SCSI connectors, one with 25 pins and another with 50. If your hard disk doesn't come with a cable or if you need to get an extra, be sure you buy a cable with the proper drive connector. SCSI devices must also be properly terminated.

The SCSI port provides hardware commonality, so the only worry when physically installing a hard disk is identifying the particular address of the drive. The Macintosh supports seven SCSI devices, all daisy-chained to the connector on the back of the computer. The Mac differentiates between SCSI devices by using a numbering system from 0 to 7 (with the Mac itself as device 7).

The majority of removable mass-storage drives we looked at provided an easy way to change the SCSI address, though some — like the Mass Microsystems UniPak — required altering a set of soldered jumpers on the controller board. Ouch.

The Macintosh SE and the Mac II have almost identical SCSI ports. The Mac II has a faster clock and dynamic bus sizing; both features allow data to be passed between drive and computer more quickly. This higher transfer rate is one reason why hard drives perform better on a Mac II.

The Mac Plus SCSI port is slightly handicapped: It lacks some physical connections to the outside world (the buzzwords are "hardware handshaking"). The computer must make up for this by substituting software workarounds for these hardware connections. This lowers the SCSI transfer rate on the Mac Plus considerably.

The SCSI port exchanges data between drive and computer using either blind or polled transfers. In a polled transfer, the Macintosh waits for confirmation that data has been properly sent or received. Blind transfers dispose of the delay imposed by data confirmation; they send bits as fast as they can be funneled through the system. Apple claims the following transfer rates for its three Macintosh models:

Computer	Speed	Transfer Type
Mac II	1.4 megabits/sec	blind
Mac SE	656 kilobits/sec	blind
	172 kilobits/sec	polled
Mac Plus	263 kilobits/sec	blind
	170 kilobits/sec	polled

Supporting the SCSI interlink between drive and computer is a software driver, an "invisible" program that tells the Macintosh how to use the hard-disk drive mechanism. Each manufacturer puts a driver on the hard disk, and the Mac loads this driver into memory when the computer is started. Most often, failure in a hard disk is the result of a damaged or erased driver; if you're lucky, fixing it is usually as simple as rewriting the driver using the original utility disk supplied with the drive. Be careful not to reinitialize if you'd like to keep your data.

Though drivers for removable mass storage are written to accomplish the same ends, they are nonetheless seldom alike among drive manufacturers. Drivers contribute to the overall integrity, speed, and reliability of a disk drive. Though two hard drives may be physically identical, different drivers can result in wide variations in performance. This is readily apparent in the removable hard-cartridge drives, all of which are based on hardware made by Syquest. The benchmark tests differ (though only moderately) mainly because of variations in software drivers.

and the drive units. Other manufacturers buy the raw components from Syquest and build them into complete drives. That's why the removable hard-cartridge drives we investigated proved to be virtual clones of one another. Except for details like price, driver software, packaging, operating manuals, and warranties, the drives are identical.

Our performance tests reveal this graphically: For the six removable hard-cartridge drives we looked at — the Peripheral Land Infinity 40 Turbo, the Mass Microsystems DataPak, the Relax Technology Mobile 42 Plus, the DPI 44 Removable, the Bay Microsystems 44RepackRemovable, and the Info Technologies Info 42R — the benchmark results were consistently within a few percent of one another.

The performance of the six removable hard-cartridge models was constant among all the drives we looked at, with average SE DiskBasher benchmark times of about 46 seconds. Internal hardware caching (see sidebar, "Removable Hard-Cartridge Systems") contributes much to the pleasing performance of these drives. The 8K cache also permits the drive to be formatted at an efficient 1:1 interleave, even if you own a Mac Plus or SE. If removable hard-cartridge drives offer so much performance and flexibility, why have they received bad publicity?

Dirt.

Not political dirt, but microscopic dirt that can contaminate the surface of the disk and cause a serious head crash. Fixed hard-disk drives are either sealed completely from the outside air or are buffered from it by a heavy paper filter. These methods of isolation prevent dust, dirt, and other contaminants from reaching the hard disk itself. In the microscopic world of magnetic read/write heads, remember, a particle of smoke from a cigarette is like a boulder on the Interstate.

Removable hard-cartridge drives rely

Capsule Reviews

Removable Hard-Disk Drives

UniPak

Comes in three sizes: 48, 84, and 102 megabytes, with higher-capacity units on the way. Nice interface makes it as easy to use as a floppy-disk drive. Unit looks remarkably similar to ProStor's. **Pros:** Very fast. 24-hour technical support. **Cons:** Units tested had no read/write activity light and no external SCSI ID switch. Formatting was very slow because of extensive verification. Mass Microsystems assures us that these deficiencies will be addressed in future models.

Mass Microsystems, Inc.
550 Del Rey Ave.
Sunnyvale, CA 94086-3528
(408) 522-1200
Chassis, $600
Disk pack, $2,600 (102 megabytes)

TransPac

Looks just like Mass Microsystems' UniPak but features Quantum hard drive and 64K cache controller board; therefore it outperforms UniPak. **Pros:** Faster than UniPak. Optional removable key lock prevents disk-pack removal. **Cons:** Documentation virtually nonexistent. Technical support not much better. Difficult to set SCSI ID.

ProStor, Inc.
55 Hawthorne St., Ste. 530
San Francisco, CA 94105
(415) 974-6462
Chassis, $285
Disk pack, $2,230 (84 megabytes). The first drive purchased is discounted by 50 percent.



PETER GOULD / MACUSER

The removable hard drives (clockwise starting at lower left): the UniPak, the TransPac (bottom), and the Disk Pack P84.

Disk Pack P84

Extra shock resistance is added to the very fast Quantum drives, and the whole thing gets packaged in a small, sturdy plastic case. 21, 42, and 125 megabytes also are available, with a 200-megabyte model waiting in the wings. **Pros:** Very user-friendly, with well-thought-out software and documentation. Easy to set SCSI ID (although it uses two consecutive IDs). **Cons:** The single unit is currently unavailable. No locking mechanism to prevent accidental removal.

MegaDrive Systems
1801 Avenue of the Stars, Suite 507
Los Angeles, CA 90067
(213) 556-1663
Chassis, $799
Disk pack, $1,699 (84 megabytes)

on a blast of air circulating over the spinning disk and positive air pressure to clear away foreign matter. Because of the construction of the drive and cartridges, the incoming airstream is only moderately filtered before the disk is exposed to it. During our tests with the six drives, we experienced one disk failure — and we aren't certain of its cause. Members of the MacUser Labs team who personally use removable hard cartridges with their own Macs report no trouble. So while the threat is there, we could find no hard proof of its consequences.

REMOVABLE HARD-DISK DRIVES

If you prize the advantages of removable mass storage but are leery of the snags imposed by other take-along systems, then removable hard-disk drives may be what you're looking for. Removable hard-disk drives are composed of two parts: a sealed module that houses the disk and read/write head mechanism, and a chassis containing the power supply.

The module docks into the chassis during normal use, automatically completing the necessary electrical and power connections to operate the drive. To remove the module, just yank it out of the chassis. You expand the available memory by purchasing additional disk modules. With high-capacity flexible and removable hard-cartridge systems, the cost of the media is only a small percentage of the cost of the drive. But the main expense of a removable hard disk is the disk module itself. That makes these drives far more expensive to expand than the other systems we looked at.

Removable hard-disk drives may represent the most expensive solution to portable mass storage, but they offer a number of worthwhile benefits. Because the disk is sealed inside a solid module, it isn't as susceptible to damage caused by handling and dirt. Removable hard-disk drives are also fast, competing in performance with the best fixed hard-disk drives for the Macintosh. They also feature high capacities. Models are available with up to 120 megabytes of storage space.

And to some, expandable mass storage

In Focus

Totable Hard-Disk Drives



PETER GOULD / MACUSER

The totable drives (clockwise starting at lower left): the Impact 80, the Plato Hardpac 20, the Maxcess, the Pocket Hammer, the Cirrus 80, and the Liberty 80.

Unlimited data storage is the primary advantage of removable mass storage. When one disk becomes full, simply eject it from the drive and insert a fresh, blank one. A significant bonus of the removable mass-storage drive is its portability. You and your data are no longer tied to your workstation. You can have computing-to-go without sorting through a box full of conventional floppies.

But what if you don't care for the removable part of removable mass storage? What if you just want a hard-disk drive that's portable enough to lug between home and office?

Enter the compact portable hard-disk drive, or *totable* — mass data storage in miniature. MacUser Labs tested several drives that we consider eminently compact and portable. Our criteria for a "compact" hard disk were few and simple.

- Must weigh 5 pounds or less.
- Must have a footprint (width by length) smaller than that of a Macintosh SE.

We found six drives that fit the bill: the Plato Hardpac 20, the Liberty 80, the Cirrus 80, the Maxcess, the Pocket Hammer, and the Impact 80. With the exception of the Plato Hardpac 20 — which stores 20 megabytes — all these drives pack a whopping 80 megabytes.

For a drive to be truly portable, it must be capable of withstanding the shock and bustle of everyday transportation. Surprisingly, we found that only one drive, the Plato Hardpac 20, contained any appreciable shock protection. The drive mechanism is mounted securely to a metal plate, and both are encased in a hard plastic shell. This strategy doesn't eliminate the small bumps and jolts that can disturb the drive during operation, but in the event of a dramatic drop, the plastic and metal frame absorbs much of the impact.

Making a hard-disk drive sturdy and shock-resistant has its disadvantages. The Maxcess and Pocket Hammer use a large quantity of metal around the drive mechanism. This metal adds considerably to the weight of the drive, reducing its portability (both drives push the 5-pound limit). The LaCie Cirrus 80 offers some protection during transportation with its padded carrying case.

Besides structural resilience, the totable hard-disk drives we looked at offer the standard safeguards, including shock-absorbing mounts (using resilient rubber to absorb vibration) and auto-parking heads. The delicate read/write heads return to a neutral zone over the disk when the drive is unmounted or turned off. By moving the heads to an unused portion of the disk, there is less chance that a head crash will disrupt important data.

Besides portability, compact drives offer another sterling advantage: speed. Leading the race for fastest Macintosh hard disk are the Liberty 80, Impact 80, Maxcess, Pocket Hammer, and Cirrus 80, with performance records that would leave the most jaded speed demon agape. Not coincidentally, all these drives employ the lightning-fast Quantum ProDrive80, now considered one of the most reliable and nimble hard-disk–drive mechanisms for the Macintosh.

We found, however, that the Impact 80 drive was significantly slower in its write

Totable-Drive Manufacturers

LaCie, Ltd.
16285 S.W. 85th, Suite 306
Tigard, OR
97224
(503) 684-0143
Cirrus 80

Everex Systems, Inc.
48431 Milmont Drive
Fremont, CA 94538
(415) 683-2222
(800) 821-0806
Impact 80

Maxcess
3440 Market St.
Philadelphia, PA
19101
(215) 386-1191
Maxcess

Aristotle Industries, Inc.
200-6975 18th Ave.
Burnaby, BC
Canada V3N 4LI
(604) 522-9880
Plato Hardpac 20

Table 3: Features of Totable Hard-Disk Drives

	Cirrus 80 LaCie, Ltd.	Impact 80 Everex Systems	Liberty 80 Liberty Systems	Maxcess Maxcess	Plato Hardpac 20 Aristotle Industries	Pocket Hammer FWB Software
Nominal capacity	80 Mb	80 Mb	80 Mb	80 Mb	20 Mb	80 Mb
Suggested retail prices	$1,099	$1,950	$1,295	$1,077	$695 or $790 for Mac II **	$1,995
Dimensions L x W x H (in.)	9.25 x 2.75 X 6.5	11.75 x 5.75 x 2.5	7 x 2 x 5	8.25 x 6.5 x 3	7 x 4.75 x 2	8.25 x 6.5 x 3
Weight (lb)	4.5	3.5	2.75	4.8	2.2	4.8
Shock rating claimed	60 G	60 G	60 G	60 G	100 G	60 G
DiskBasher benchmark on SE (sec)	37.4	83	37.65	37.9	64.2	42.8
DiskBasher benchmark on Mac II (sec)	26.7	45.9	27.44	27.5	N/A ***	27.6
Duplicate a 6-Mb file on SE (sec)	56.2	93.5	53.6	57.4	92.3	60
Duplicate a 6-Mb file on Mac II (sec)	41.4	36.1	37.56	40.9	N/A ***	40.7
Warranty	1 year	1 year	1 year	2 years	1 year	1 year
Read/write indicator light *	absent	yes	yes	yes	power indicator blinks	absent
Method of setting SCSI ID switch	internal jumper	digital button on bottom	digital button on rear	rotary on front	inaccessible internal jumper	rotary on rear
Miscellaneous	Carrying case, lots of good software.	Nice case.	Nice, compact daisy-chain connector. Stand to keep drive upright is provided.		Annoying power-supply adapter.	Some good software.

* All totable drives tested have a power indicator light.
** On a Mac II, this requires an external power module.
*** The Plato Hardpac was not tested on a Mac II.

times than the other drives. Everex Systems assures us that the problem will be fixed with a driver update.

On the basis of support software, all the compact drives proved similar. The only big difference was posed by the Plato drive, which came with no software at all. The Plato arrived preinitialized with a 3:1 interleave; Aristotle Industries assumes that, should the drive ever need reinitializing, you'll use the Apple hard-disk software.

With only one exception, compact hard-disk drives extract their power from an AC wall socket, just as your Macintosh does. To use the drive, you must first plug it in and then stretch a suitable SCSI cable between the drive and the Mac. This arrangement isn't as effortless as shoving a disk cartridge in a removable mass-storage drive, but the trivial weight of the average compact drive makes the task of installation more palatable. Most "toters" here at the Labs keep a connected SCSI cable at each location, making installation as painless as possible.

Standing apart from the crowd, the Plato Hardpac 20 derives its power from the external drive connector on the back of your Mac Plus or Mac SE (the Plato cannot be used with a Mac II unless you add an external power supply, an added-cost option). This makes the Plato slightly easier to install — you don't need to hunt down a wall socket — but it prevents you from using an external floppy drive with your Mac. You'll need to weigh these pros and cons for yourself.

FWB Software, Inc.
2040 Polk St., Suite 215
San Francisco, CA
94109
(415) 474-8055
Pocket Hammer

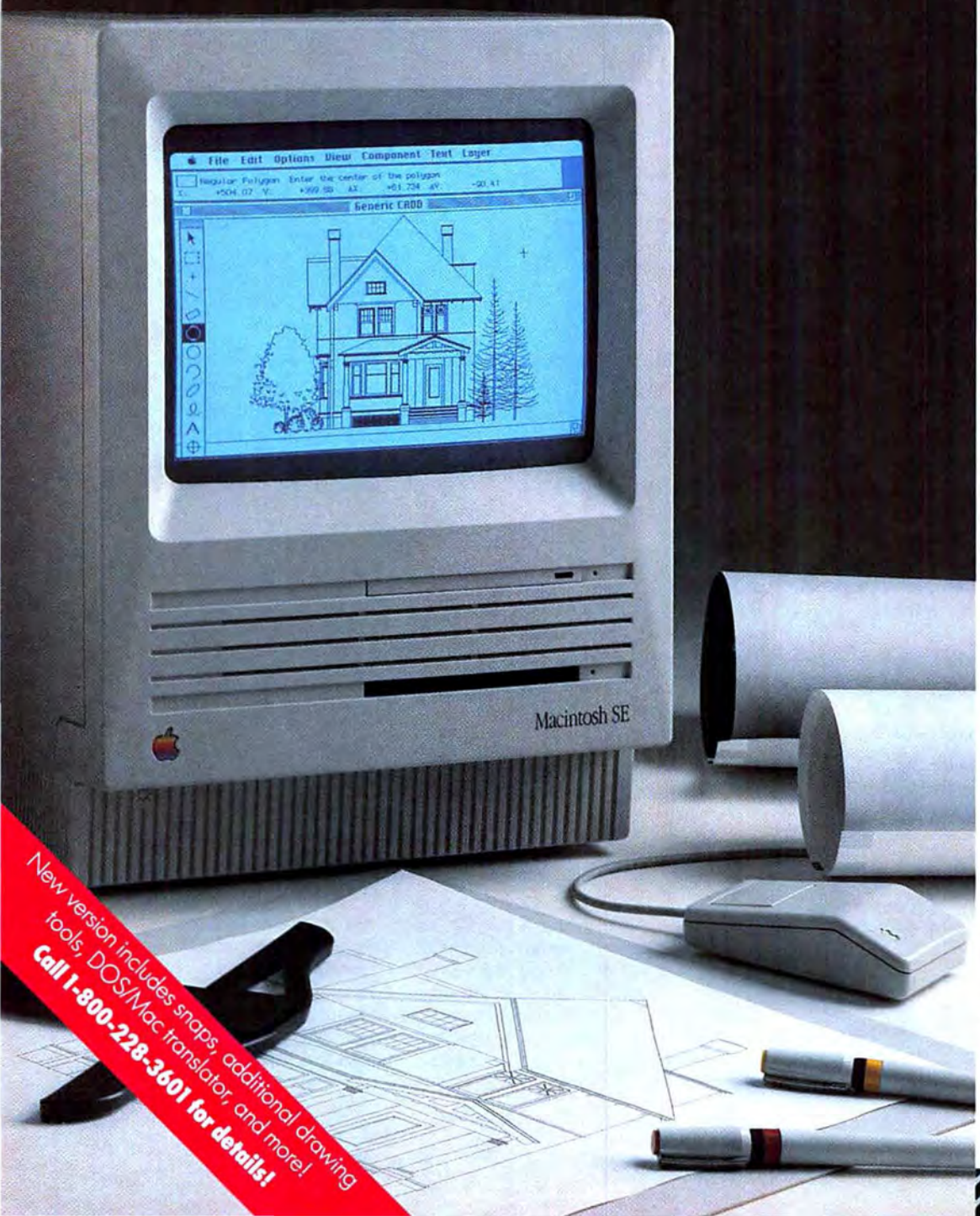
Liberty Systems
120 Saratoga Ave., Suite 82
Santa Clara, CA
95051
(408) 983-1127
Liberty 80

Totable Tally



Of all the totables tested, we recommend Maxcess' drive of the same name and LaCie's Cirrus drives. The Maxcess drive costs $1,077 and includes FWB Software's Hard Disk Partition, a formatter, and a security program called Hard Disk Deadbolt. At $1,099, LaCie's Cirrus 80 is priced attractively and is accompanied by some very neat software: SilverLining and SilverServer. As another bonus, LaCie throws in a carrying case. FWB Software's Pocket Hammer drive has the same good FWB Software programs as the Maxcess but costs $1,995. The $1,950 Impact 80 from Everex Systems has a nice rugged case. The Liberty 80, a last-minute arrival from Liberty Systems, is the most compact and comes with some nice software (a licensed version of Mass Microsystems' Padlock). The only non-Quantum drive was the Plato Hardpac 20, from Aristotle Industries, which appears to have the most rugged packaging of all. However, its unusual cabling scheme, slow speed, low 20-megabyte capacity, and lack of software make it hard to get excited about — especially at $695.

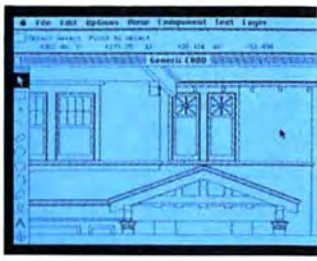
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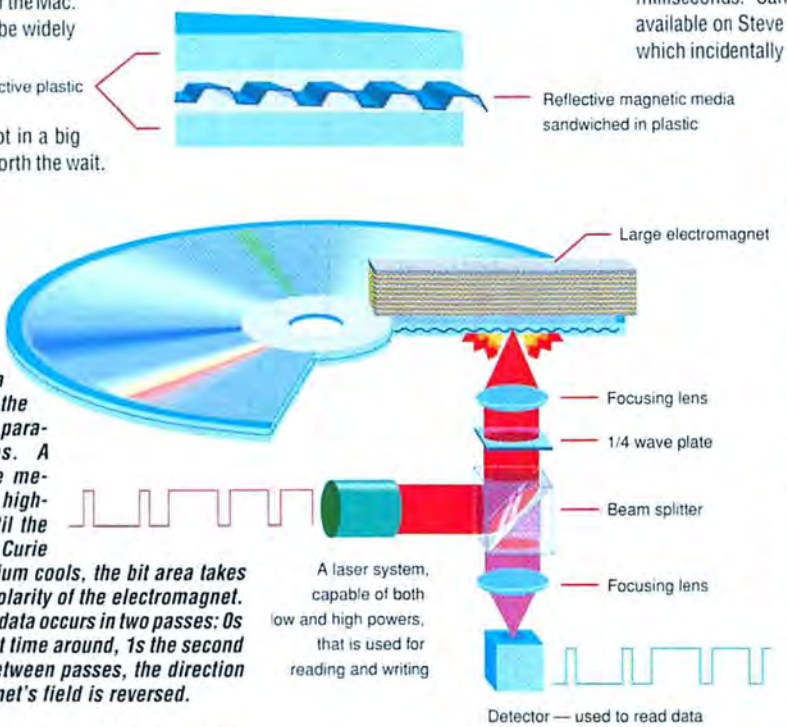
CODE 302

Magneto Optical

Mag-neat-oh is more like it. Here's one that could give the Syquest-type drives a run for their money. At Comdex/Fall, Verbatim (a subsidiary of Kodak) introduced a 3.5-inch (not 5.25-inch like the Sony and Canon) thermal magneto-optical (TMO)–type drive for the Mac. These drives won't be widely available until the summer of '89, but if you're not in a big hurry, it might be worth the wait.

The drive will cost about $3,000, with 60-megabyte cartridges available at approximately $100 each. Verbatim claims a 30-millisecond average seek time and a 12.5-millisecond latency for an access time around 40 milliseconds. In the 5.25-inch TMO arena, Sony, Canon, and Maxtor all have SCSI-equipped drives just waiting for someone to come along and add a Mac driver. These drives, which all will be in the $5,000 price range, hold from 512 to 650 megabytes and have reasonably fast access times of from 90 to 100 milliseconds. Canon's drive is currently available on Steve Jobs' NeXT machine — which incidentally makes merely half of its 512-megabyte capacity available, as it uses only one side of the cartridge. Pinnacle Micro (Irvine, Calif.) will offer a Mac implementation of the Sony drive. This package, which should be shipping by the time you read this, sports a $5,995 drive and a $230 (650-megabyte) cartridge.

Magneto-optical technology, with its virtual immunity to environmental effects, will offer a reliable and cost-effective alternative to conventional, relatively fragile magnetic storage.



***Write:** A "write" relies on the Curie point, which is the temperature at which there is a transition between the ferromagnetic and paramagnetic phases. A small area on the medium is heated by a high-powered laser until the area reaches its Curie point. As the medium cools, the bit area takes on the magnetic polarity of the electromagnet. Writing a sector of data occurs in two passes: 0s are written the first time around, 1s the second time around. In between passes, the direction of the electromagnet's field is reversed.*

***Read:** A "read" relies on the Kerr effect. Low-powered laser light, which is polarized as it passes through the beam splitter, is reflected by the surface of the media. The Kerr effect states that polarized reflected light will be rotated either clockwise or counterclockwise, depending on the direction of the previously recorded magnetic field on the reflective media. The reflected light is run back through the beam splitter and, depending on the rotation of the polarization, is either stronger or weaker upon hitting the detector. The detector converts these variations in intensity into 1s and 0s.*

In general the disk looks like a CD. But it's covered by a plastic case and is a darker color. To read the other side of a disk, you must flip it over like a phonograph record. As with a hard drive, the data is stored on tracks and sectors. Different manufacturers have different systems for moving the read/write mechanism to the proper track and for keeping the mechanism aligned with a given track. Some manufacturers use a concentric track structure; others use a spiral structure.

MARK W. SWEENEY / MACUSER

itself is less important than the security of the data. Both the MegaDrive Disk Pack P84 and ProStor TransPac drives provide at least a rudimentary key-lock system as well as security software to prevent theft or unauthorized use. The Mass Microsystems UniPak comes with password-security software but lacks a key lock.

MAKING THE CHOICE

Which high-capacity mass-storage drive is for you? Before you commit and sign that check, consider price, expansion cost, performance, reliability, and portability.

PRICE

Of the models we tested and detailed in Table 1, "Main Summary of Features," retail list price varied from a high of $3,495 for the SuperMac XP 60+B (a combination fixed and removable drive) to a low of $899 for the Mirror Technologies RM20. Average price is about $1,800 — that correlates to the typical cost of a removable hard-cartridge drive. These prices are for either single- or double-drive models, as noted, and include at least one blank disk.

On the whole, removable mass-storage drives cost 20 to 40 percent more than fixed SCSI hard-disk drives with comparable capacity. Keep that in mind.

EXPANSION COST

Removable mass storage assumes you want to add more capacity later on. Ponder the expense of additional disks to expand your memory, and consider the cost of the disk in relation to its capacity. That gives you a rough idea of the cost of long-term ownership. It's similar to judging the overall cost of a car by adding in its annual fuel costs.

For example, 25 bucks buys one 10-megabyte disk for the Infinity 10; that's a cost of $2.50 per megabyte. All in all, not a bad deal. The 44-megabyte media for removable hard-cartridge drives cost around $125. That equates to a per-megabyte cost of about $2.85. The 20-megabyte cartridges for the Bernoulli Box II/20 are among the most expensive: $4.20 per megabyte.

Removable hard-disk drives represent the most exorbitant means of storage expansion. Additional modules cost on the order of $1,000 — roughly $25 per megabyte (assuming a 40-megabyte disk capacity).

PERFORMANCE

MacUser Labs performed numerous tests to determine the overall performance of each drive. DiskBasher, our main benchmark, performs a sequence of reads and writes using the highest level of Macintosh hierarchical file system. It closely duplicates the disk-drive access of an application program but without tying up CPU time. The results, as shown in the benchmarks (Table 1), are shown in seconds. The lower the number, the better. Results are provided for both the SE (test machine equipped with 1 megabyte of RAM) and the Mac II (with 5 megabytes of RAM).

The winners? We discovered that the technology of the drive contributed most to its overall performance. The modular removable hard-disk drives won the DiskBasher performance race, with SE times under a respectable 40 seconds. These results compare favorably with or even exceed those of nonremovable hard-disk drives for the Macintosh. Removable hard cartridges placed a close second, with SE times ranging from 45.2 seconds (Mass Microsystems DataPak) to 48.8 seconds (DPI 44 Removable). The high-density floppy and Bernoulli drives placed third, with speeds as slow as 236 seconds.

RELIABILITY

Reliability is not an easy test for you or the MacUser Labs to perform; it consists of much more than mere torture-testing of a drive or ad hoc determination of whether it's a piece of junk. Rather, you should consider the reputation of the company, the dependability of the media against accidental damage (a real possibility given the portability of the disks), and after-sales support.

PORTABILITY

The smaller the disk, the easier it is to carry with you or to mail across the country. The flat high-density floppy disks used by the Jasmine MegaDrive 20, the Mirror Technologies RM20, and the Peripheral Land Infinity 10 are perhaps the most portable of the bunch, and they seem the least liable to be damaged by crushing or dropping. They're lightweight, and they're small enough to carry around in a briefcase or to fit into any 5.25-inch disk mailer. The 5.25-inch disks for the Iomega Bernoulli Box II/20 and the removable hard cartridges can be readily shipped by UPS, Federal Express, or U.S. Mail, and they stow easily in a briefcase or portfolio. Removable hard cartridges come in their own plastic storage cases, which afford some protection against accidental drops and the ravages of the environment.

But beware: Removable hard cartridges can be seriously damaged if dropped. One hard cartridge fell 3 feet to the linoleum MacUser Labs floor and suffered a crack in one corner. Impressively, the disk still functioned after the drop, but if this happens to you, back it up immediately. There's no telling how long dropped media will last, even if it is never again subjected to abuse.

The least portable and most fragile media are the 8-inch Bernoulli Box cartridge and the modules designed to fit inside the chassis of a removable hard-disk drive.

OTHER CRITERIA

You may also want to consider these criteria in selecting a suitable removable mass-storage drive:

• *Sharing data with others.* Get the type of drive used by friends, associates, and clients so you can readily trade data. Media for removable hard-cartridge drives are interchangeable among other Syquest-based makes and models, making them the most versatile.

• *Using the drive for making backups.* To be effective in making backups, the removable drive should have a capacity roughly equal to that of your fixed drive. Or be sure the drive comes with a backup program that enables you to divide the contents of the fixed drive over two or more high-capacity disks.

• *Fitting a removable drive on your desk.* Unlike a fixed hard-disk drive, which can be implanted in a Mac II or tucked out of the way, a removable mass-storage drive must be easily accessible. Choose a drive that fits comfortably on your desk and allows easy insertion and removal of the disk.

JUDGING FOR YOURSELF

The MacUser Labs test results paint an accurate and objective picture of the performance of removable mass-storage drives. We tested each drive with both a Macintosh SE and a II. In some cases, you'll note an unusual disparity between the test results.

This is primarily caused by how drivers and controllers interact with revised Mac SCSI software. Obviously, you'll want to consider the best drive for your needs based on the type of Macintosh you own. If you have a Mac Plus, follow the test results given for the Mac SE. But add a few points to compensate for the slower speed of the Plus.

Equipped with a removable mass-storage drive, you can now dare your Mac to display its insidious "Disk full" message — and live to tell the tale. ■

GORDON MCCOMB IS THE AUTHOR OF A DOZEN BOOKS ON COMPUTER AND HIGH-TECHNOLOGY TOPICS.

KUDOS

MACUSER LABS WOULD LIKE TO THANK THE FOLLOWING CONSULTANTS FOR THEIR ASSISTANCE WITH THIS PROJECT: ERIC ERICKSON, TOM SANTOS, DAVE NELSON (NUVO LABS) CHRIS SCHAEFER, ERIK RAMBERG



Tester's Choice

In the high-capacity flexible arena, if cost is your main consideration, then go with Mirror Technologies, Jasmine, or Peripheral Land. **Jasmine's MegaDrive 20** comes with good commercial utilities, worth well over the hundred dollars you save by buying **Mirror Technologies' RM20.** Otherwise the two drives are nearly the same. **Peripheral Land's Infinity 10** offers the cheapest way to distribute 10 megabytes of data. Its 5.25-inch floppy disks are the lightest and least expensive.

On the other hand, if the shipping product matches the performance of the unit we tested, then **Iomega's Bernoulli II/44** would be one removable system we could highly recommend. We looked at a preproduction unit that should be available by March '89. This drive should offer a very good mix of reliability and speed at a reasonable price. But don't plan on reading your old 20-megabyte cartridges with it — that's not going to happen.

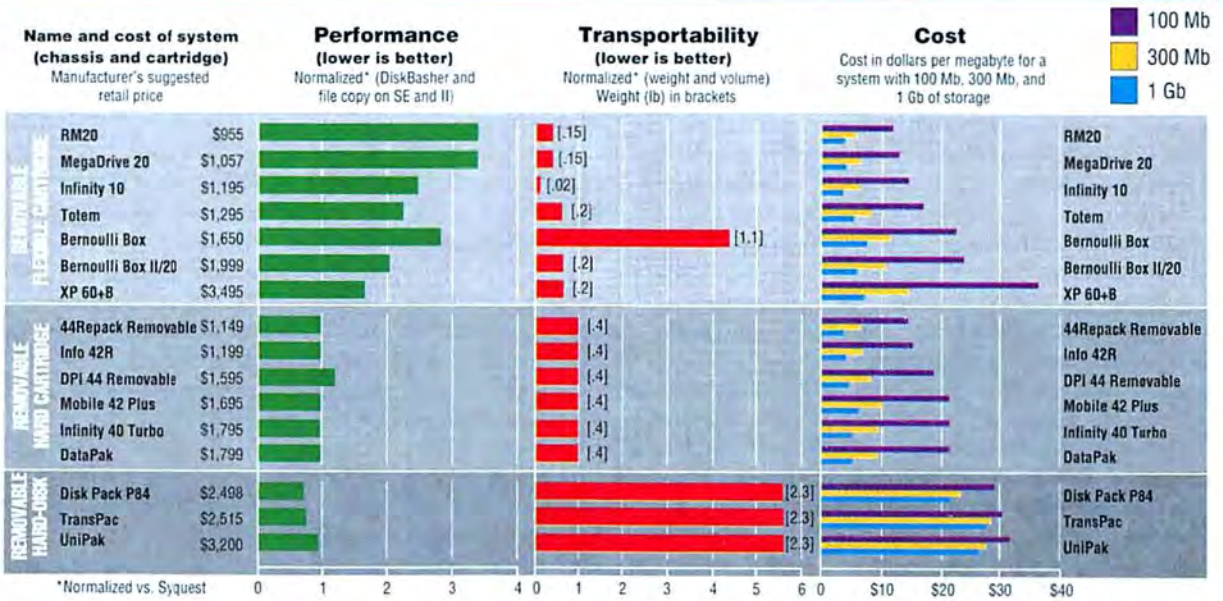
As far as the removable hard drives are concerned, you do get a fast, quiet, and "sealed" drive, but we're still not sure how to justify the high recurring cost of additional capacity. In any case, if locking up 80 megabytes of data every night is your thing, then any of the three units we tested would fit the bill. But then you could do the same thing with any of the removable-media drives for less cash.

When it comes to removable hard cartridges, if you're willing to take a chance on a newcomer (we got an answering machine when we called), consider **Bay Microsystems;** you can't beat the $1,149 price. Another newcomer, **Info Technologies,** provides a $1,199 price along with good service and support. This could make a big difference if you need to know that someone is there to help.

In general, we don't have a problem recommending any of the Syquest-type drives. If you're still not convinced that Syquest drives are the answer, you might consider waiting a few months for magneto-optical drives to appear (see sidebar, "Magneto Optical"). However, even then, it might be wise to wait a bit longer and see whose standard will prevail.

The totable drives are perhaps the most practical solution for data on the go. An extra SCSI cable and AC cord are all that you need at the other end. The 3.25-inch Quantum PrJDrive 80 appears to be the drive of choice for these manufacturers. Here we prefer **Maxcess,** which comes with a low price and FWB software. We also like **LaCie's Cirrus 80** with SilverLining and SilverServer included at the quite reasonable price of $1,099.

Performance Tests

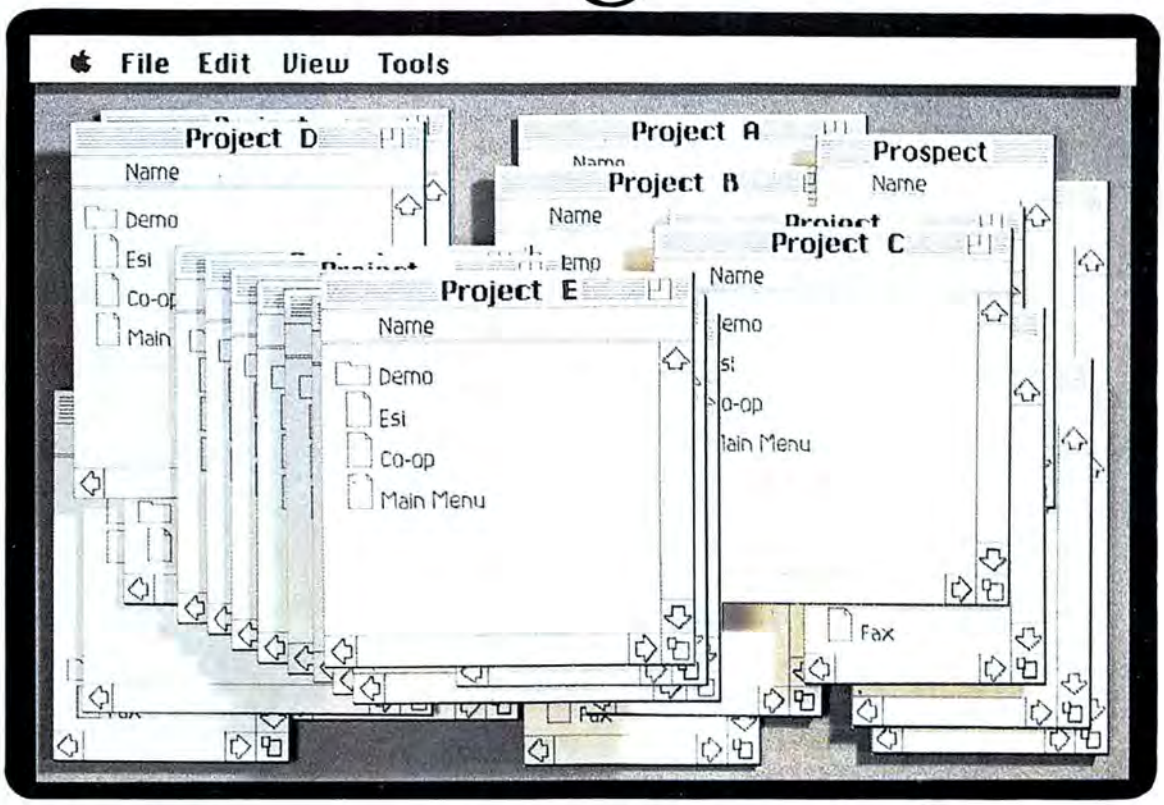


The following tests were used to evaluate performance. Tests were repeated three or more times on both a Mac SE with 1 megabyte of RAM and a Mac II with 5 megabytes. To create the performance chart, we averaged all tests together.

• DiskBasher — This is a test created in the MacUser Labs by Stephan Somogyi. DiskBasher is a simple test that stresses the ability of a drive and hierarchical file system to interact. Essentially, it measures a drive's performance as seen through the "eyes" of the file system. We selected a 10-megabyte test. First, a 10-megabyte contiguous space was allocated on disk. This guaranteed that file fragmentation caused no unnecessary overhead during the test. When the test began, a block was written and read right back again. The block size ranged from 10K to 200K; the size was determined randomly at run time for each read/write cycle. After the first iteration, a new block size was determined, and the block was written to disk and read back again. This process continued until the 10-megabyte file-size limit was reached.

• Duplication Test — The last test was a real-time test that involved the duplicating of a 6,413K folder. The test began when we issued the Duplicate command from the File menu and ended when the copy was completed. The results were then displayed in total number of seconds required to copy the folder.

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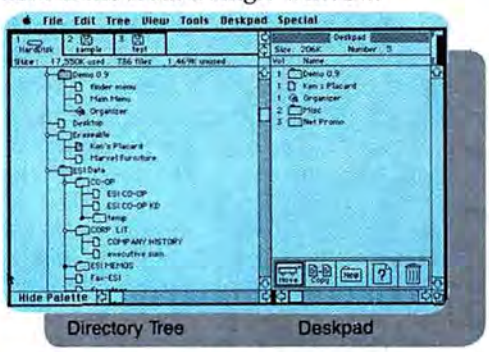
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Much Ado About Something

Apple adds some X appeal to the SE with the SE/30, the second in a new line of 68030 Macintosh computers. It's fast, it's portable, and it supports Color QuickDraw. But it's still not a laptop.



PHOTOS: PETER A. GOULD

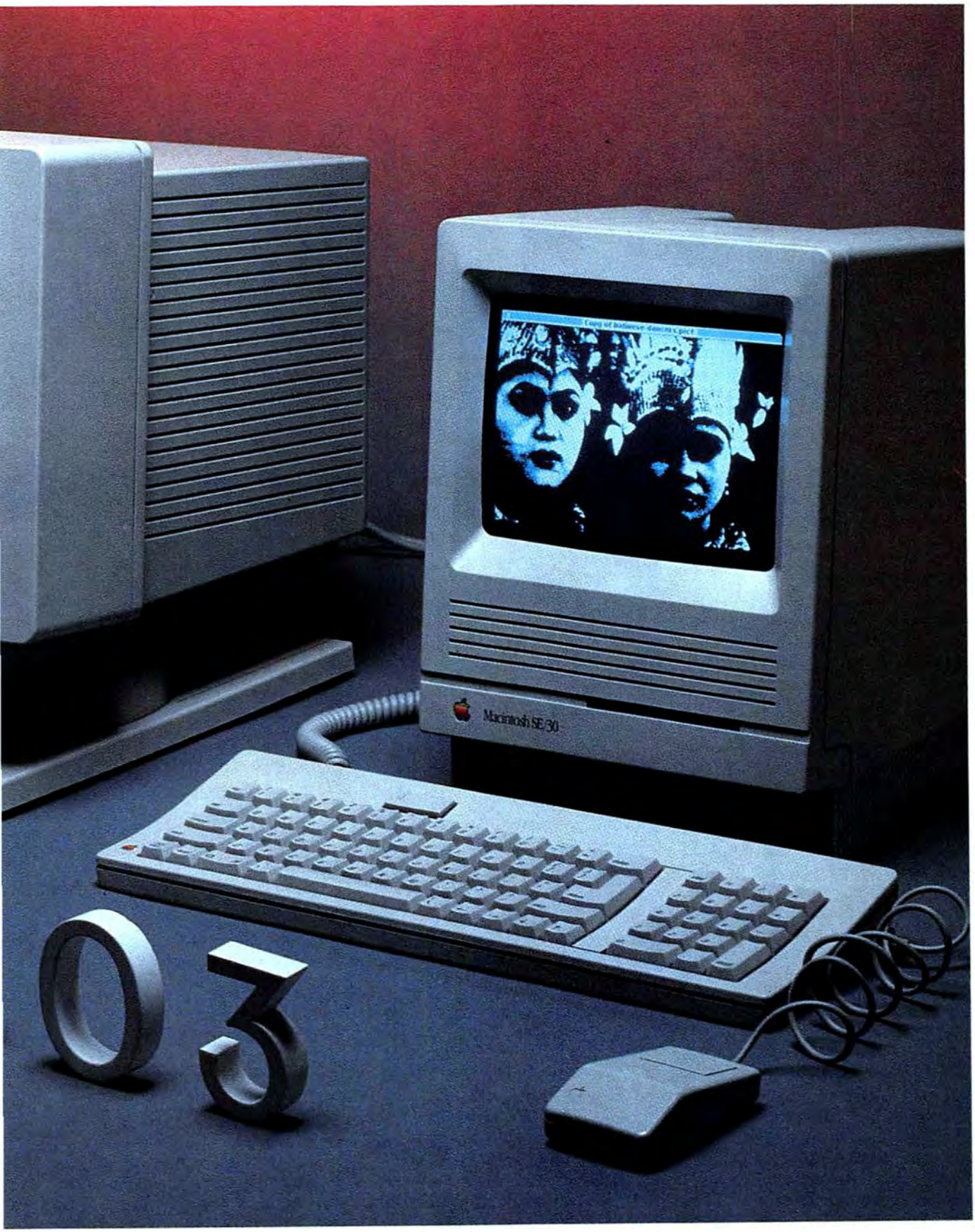
Sometimes the loudest words are those that go unspoken. Take Apple's Macworld announcement, for instance. The biggest surprise was what wasn't announced. Still no laptop. No three-slot Mac II. And no full-page or two-page monitor, either. But Apple did unveil a new CPU, the Macintosh SE/30, a Mac IIx in SE clothing. Or is it an SE with IIx power? In any case, the new machine sports a 68030 microprocessor and 68882 floating-point numerical coprocessor, both running at 16 megahertz.

The presence of the 68030 chip and the IIx ROMs (in removable SIMMs, just as in the IIx) put this machine in a class apart from the old SE. With the advent of the Mac IIx and the SE/30, Apple begins a whole new family of computers based on the 68030 chip. This hardware platform represents the future of Macintosh computing.

With the 68030, you have a machine that is approximately four times as fast as the standard SE (see accompanying chart for further details), though you can also get speed from an accelerator board. Another noteworthy feature with the 68030 chip is that the PMMU (Paged Memory Management Unit) is integrated into the CPU. The IIx ROMs provide full support for Color QuickDraw, which means that you can add an external monitor — gray-scale or color — and still use the internal 9-inch. The internal screen, however, is neither color nor gray-scale. The people at Apple, feeling a sudden surge of price consciousness, said they "wanted to keep the price down."

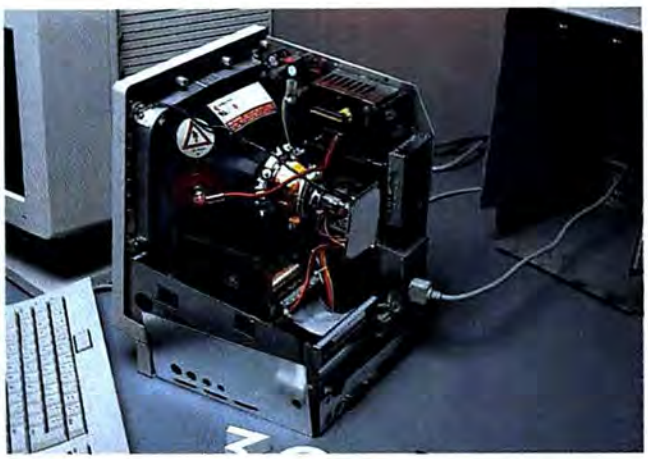
Breaking the 4-megabyte barrier within an SE, the SE/30 has eight slots for RAM SIMMs. This is already common to the Mac II product line. Keep in mind, though, that the light at the end of the tunnel could be an on-

BY HENRY BORTMAN


Macintosh SE/30
03



With the SE/30, Apple ships the second in its line of 68030-based computers while maintaining portability and a small footprint. Note that all SE/30s contain hard-disk drives. There is no "slot" for a second internal floppy drive.



The SE/30 boasts a new design for the chassis. Now, instead of cards sitting parallel to the motherboard, they stand perpendicular to it.

coming train. With the SE/30, you can no longer upgrade two SIMMs at a time; you have to bite the bullet on four.

NUBUS OR NEW BUS?

And just how is Apple going to put a 68882 coprocessor, ROM SIMMs, and eight RAM sockets inside that box and stay compatible with existing expansion boards? Well, they're not. Meet the 120-pin 030 Direct Slot, the successor to the SE's 96-pin SE-Bus expansion interface. It's not a *NuBus* slot. It's a *new bus* slot. So if you have old SE expansion boards, you can kiss them goodbye as far as the SE/30 is concerned. They won't fit. And if you could make them fit, they wouldn't work. Kind of like plugging an electronic square peg into a round hole. Direct Slot cards fit vertically inside the SE/30, not horizontally as expansion cards do in the original SE. To accommodate this, the chassis has been redesigned; it has a hole in it for the Direct Slot cards to stick up through.

There is, however, a method to Apple's madness. The 96-pin connector in the old SE couldn't support the full 32-bit addressing capabilities of the 68030. An interesting side effect of the new arrangement is that auxiliary cards plugged into the 030 Direct Slot may perform better than their NuBus counterparts. NuBus cards have to share use of the bus; that is, they are required to ask for "permission" before putting data on the bus. This slows things down a bit. For the most part, Direct Slot cards can be less polite and therefore can accomplish their work faster (no moral lesson implied here).

FULL HOUSE OR BUST?

So what boards did Apple offer for the 030 Direct Slot when the SE/30 shipped in January? Fortunately or unfortunately (depending on how you look at it), they're offering none. That's right. Neither a video-display

Dealing a Full Deck

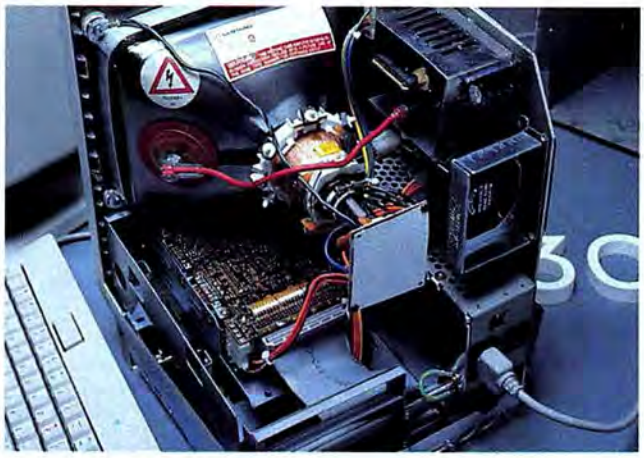
Five companies let us know — in time to let you know — that they were planning to announce expansion cards for the SE/30 Direct Slot at January's Macworld Expo. Here's a brief rundown of the products we knew of at press time. We'll be bringing you more complete information as the picture fills out.

Filling the video gap left by Apple, who chose not to offer any video cards for the Direct Slot — even for its own monitors — SuperMac Technology announced the Spectrum/SE. The Spectrum/SE will support the Apple 12-inch gray-scale and 13-inch color monitors as well as SuperMac's own 19-inch gray-scale and Spectrum color monitors. As far as we could determine, no one had plans to announce a Direct Slot card that could support the Apple Workstation Display. Pricing had not been set by press time. SuperMac did say that it will deal out the card in the first quarter of 1990.

But what if you already have an SE with a SuperMac card and you upgrade your SE to an SE/30? Will SuperMac cut you a deal on a video-card upgrade? Don't hold your breath.

Looking for Ethernet? Kinetics will provide a solution with a Direct Slot–compatible addition to its EtherPort line. It will be priced "comparably with other EtherPort products," which means Kinetics couldn't tell us how much it was going to cost. Again, no upgrade policy for existing EtherPort/SE owners. This is expected to ship in February.

If you want a 3270 connection to an IBM mainframe — there's no accounting for taste — Avatar announced an SE/30-compatible implementation of its MacMainFrame product, priced "close to" the $795 list of the currently shipping MacMainFrame/ SE. The new card, which provides a coaxial connection to an IBM controller, will come with the same MacMainFrame software currently available for the SE and II. It allows users to use their Macs as 3270 terminals and to transfer files between the Mac and IBM mainframes. A prototype was demonstrated at Macworld Expo; the real item will be available early in



Like the IIx, the SE/30 comes with an FDHD SuperDrive, capable of reading 1.4-megabyte MS-DOS and Apple II PRO-DOS disks, as well as Mac disks.



Even the ports on the back of the SE/30 are similar to those of the standard SE. The only difference is that the sound port is stereo.

the second quarter. There has been no word yet on the upgrade question.

Digidesign will ship an SE/30 version of its Sound Accelerator, which is currently available in NuBus and vanilla SE models. The card provides a digital-to-analog converter and digital signal processor capable of working with 16-bit digital signals sampled at up to 44.1 kilohertz. Sounds can be stored directly to, or played back directly from, a Mac hard disk. In other words, this card — based on the same Motorola 56001 chip that can be found on the NeXT motherboard — brings NeXT-like sound-processing capabilities to the SE/30. And, you can actually get one. It comes with software that allows you either to work with prerecorded 16-bit stereo digital sounds or to generate synthesized music. Options include the AD IN box, which lets you record 16-bit digital stereo from real-world audio, and Sound Designer II, a more advanced digital signal processing (DSP) application. Prices are the same as for current SE and II products: $1,295 for the Sound Accelerator, $995 for the AD IN box, and another $995 for Sound Designer II.

And, finally, Micron Technology announced plans to sell a memory parity checker, capable of supporting up to 32 megabytes of RAM. Mac memory is not parity-checked, and parity checking is a required feature of U.S. government–approved microcomputers. This item, the details of which remained shrouded in obscurity at press time, would help Apple make those all-important government sales.

And what will the future bring? There's no NuBus on the SE/30, just a lone Direct Slot. But it doesn't take too active an imagination to conceive of users wanting to add more than one extra goody onto this delightful new box. Who wants to choose between Ethernet and a second monitor? Between sound and color? Between parity-checked memory and 3270 connectivity? There's always the three-slot Mac II, which should be here some day. But, although no one's talking yet, we can also expect to see third parties banding together to provide such combinations on power multifunction Direct Slot cards.

card to drive their monitors, an Ethernet card, nor an Apple Drive 5.25 card is coming from Cupertino.

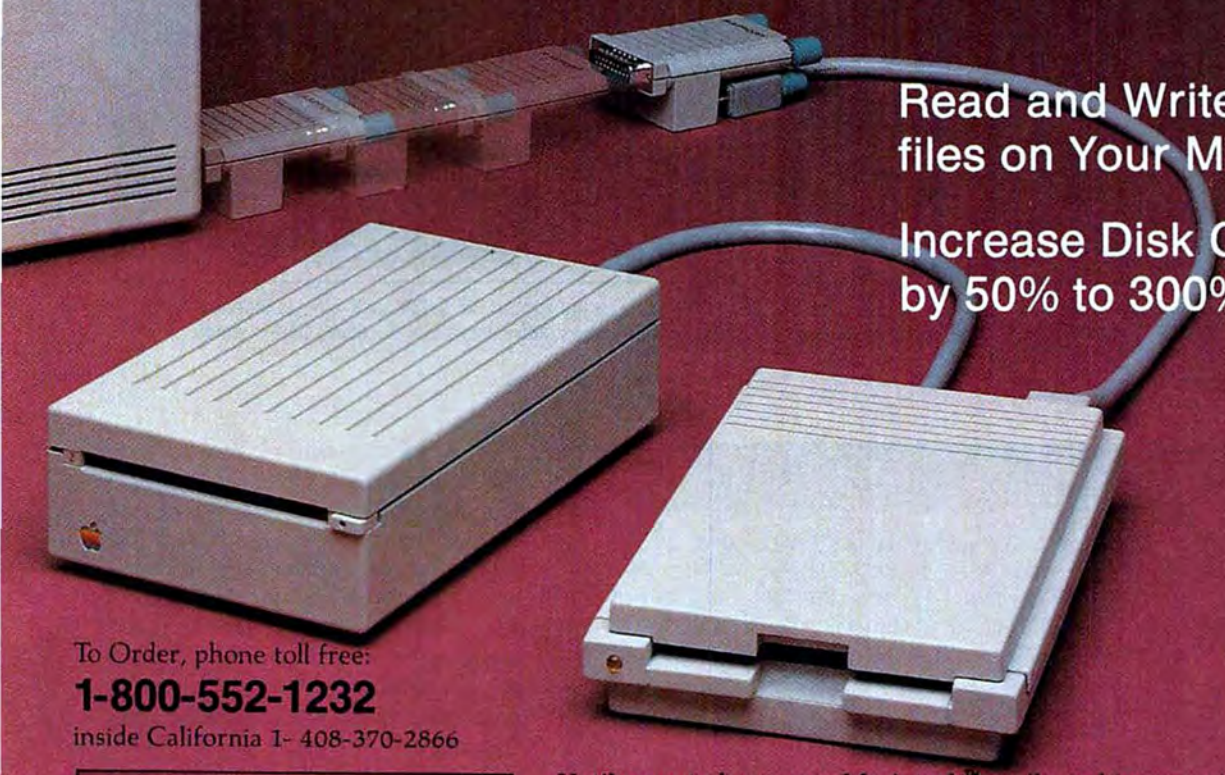
Instead, Apple is leaving this to third-party developers (see sidebar, "Dealing a Full Deck"). At press time, we knew of five such cards slated to be announced at Macworld: a video card from SuperMac, an Ethernet card from Kinetics, a 3270 (IBM mainframe) connection from Avatar, a memory parity checker from Micron Technology, and a sound accelerator from Digidesign.

A sound accelerator? Yes, because the Apple Sound Chip in the SE/30 is the same four-voice stereo variety as the one found in the Mac II and IIx. The sound port on the new Mac's back panel is, accordingly, also stereo. When hooked up to a pair of good speakers, it sings. Beautifully, I must say. Apple knows what it's doing in promoting the SE/30 as a music workstation.

Apple will offer the SE/30 in two configurations, an HD40 model and an HD80 model. Both will have a single 1.4-megabyte FDHD internal high-density floppy-disk drive (the SuperDrive). The SuperDrive supports 1.4-megabyte MS-DOS and PRO-DOS (Apple II) floppy disks as well as standard 400K and 800K Macintosh disks. The HD40 model will come with 2 megabytes of RAM and a 40-megabyte internal hard-disk drive. The HD80 will have 4 megabytes of RAM and an 80-megabyte internal hard drive. There is no two-floppy model, although an external floppy disk can be connected through the standard floppy-drive port on the back of the machine.

The SE/30 comes with a new version of System software, System 6.0.3 — nothing earth-shattering, just a few changes to support the new hardware platform. If you don't have an SE/30, you don't need System 6.0.3. And Apple promises that 6.0.2 and 6.0.3 will

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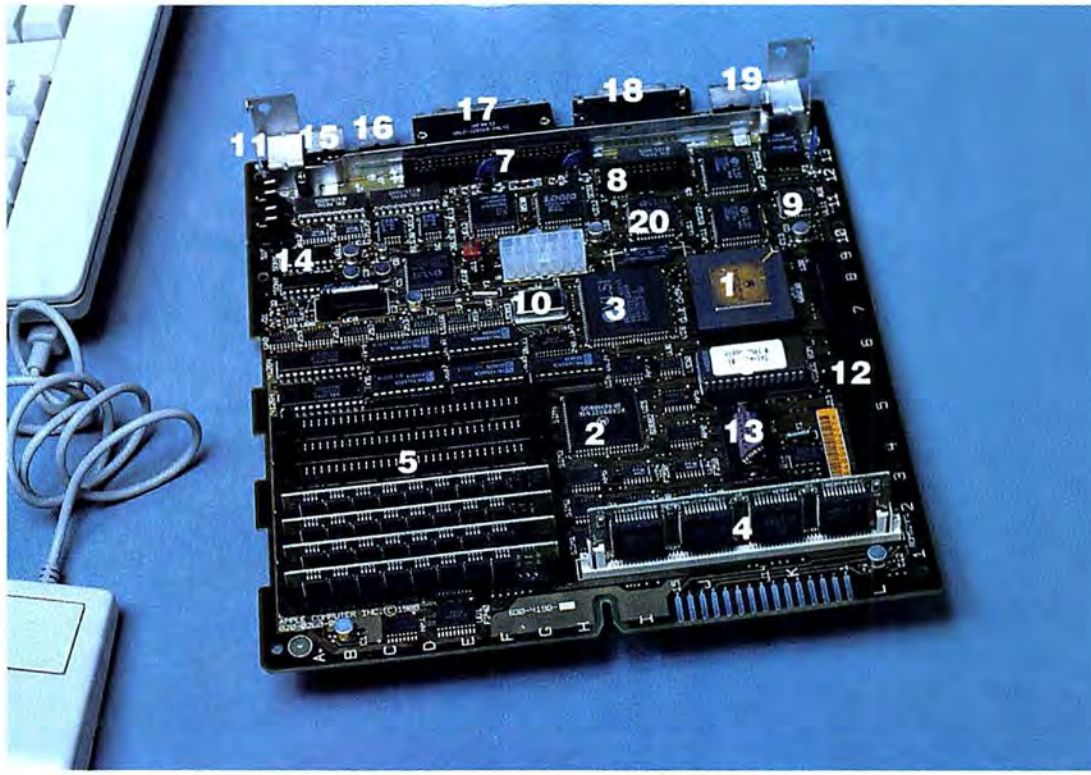
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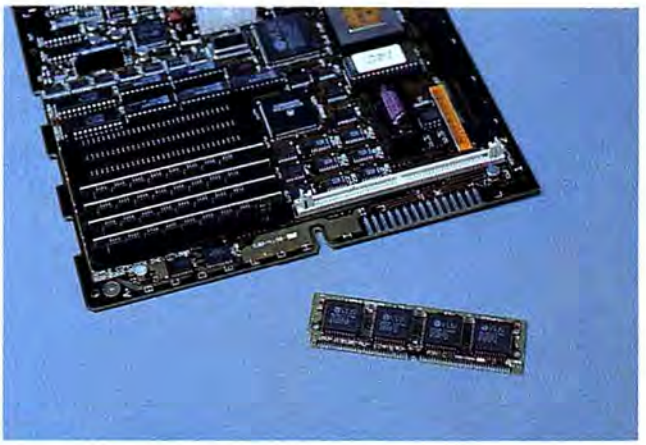
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14 Stereo sound chips
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17 External SCSI port
18 External floppy-drive port
19 ADB ports
20 SWIM chip (FDHD controller)

Table 1: Macintosh SE/30 Specifications

CPU	Motorola 68030 at 15.7 kHz	
Math coprocessor	68882	
PMMU	Integrated	
Memory expandability	8 Mb (with 1-Mb SIMMs)	
ROM size	256K (removable SIMM)	
Color QuickDraw	Supported	
Sound	Apple Sound Chip (four-voice stereo)	
Floppy drive	FDHD (SuperDrive)	
Disk capacity	400K, 800K, 1.4 Mb	
Disk formats	Mac OS, MS-DOS, OS/2, PRO-DOS	
Interfaces	ADB (2), LocalTalk, modem, SCSI, external floppy, stereo mini	
Expansion slot	120-pin 030 Direct Slot	
Configurations	HD40	HD80
RAM	2 Mb	4 Mb
Internal hard-disk drive	40 Mb	80 Mb
Price	$5,069	$6,369



The SE/30's ROMs are on removable SIMMs just as in the IIx. This will make future ROM upgrades relatively easy and inexpensive.



A new bus — not NuBus — is what you have with the SE/30. Apple calls the new 120-pin slot the Direct Slot 030. Shown installed here is SuperMac's Spectrum/SE board.

coexist very peacefully on the same network. (But they haven't tried it on our network, where Murphy's Law reigns supreme. We, too, have a promise: If it can break, we'll break it. Stay tuned.)

MAKING HEADS AND TAILS OF IT ALL

Faster than a speeding standard SE. More powerful than a Mac II. Whether or not it can leap tall, um, towers is another story. But with a machine that can do all this, the big question in our minds after this announcement was whether or not this would spell the end for the Plus. We were met with a vehement, "No, no, no!" from Apple executives as they emphatically insisted that they're not abandoning Pluses. "They're selling too well," they told us. But something is in the wind.

With the 68030 chip, it is clear that Apple is paving the way for its new multitasking operating system, which mortals may someday get to see. The future Mac OS will require a hardware platform containing two things at a minimum: paged memory management, provided by the PMMU, and lots of memory to manage (maybe you will be able to run it on 2 megabytes, but maybe you will really want 8 megabytes or more to fly). So while the Plus may still have a future on the low end, the days of the Mac II appear numbered. The 68030-based Macintosh IIx, with its built-in PMMU, is both faster and cheaper to produce than the 68020-based Macintosh II, which requires the addition of a separate chip to achieve paged memory.

Apple product managers also assured us that, while Apple will indeed continue to evolve its operating system (and, of course, certain hardware platforms will be required to take advantage of certain new features of that system), they will continue to support

MPW 3.0 — The Next Generation

Not an announcement of a new laptop, but an incredible simulation. Well actually, it's Apple's latest release of the Macintosh Programmer's Workshop (MPW), version 3.0.

MPW 3.0 comes with a C compiler, a completely new product developed in-house at Apple. Its compilation speed is roughly twice that of the 2.0.2 compiler, and it also adheres to the latest draft of the ANSI C proposal. It also boasts a much better compile-time error detection than 2.0.2's C compiler.

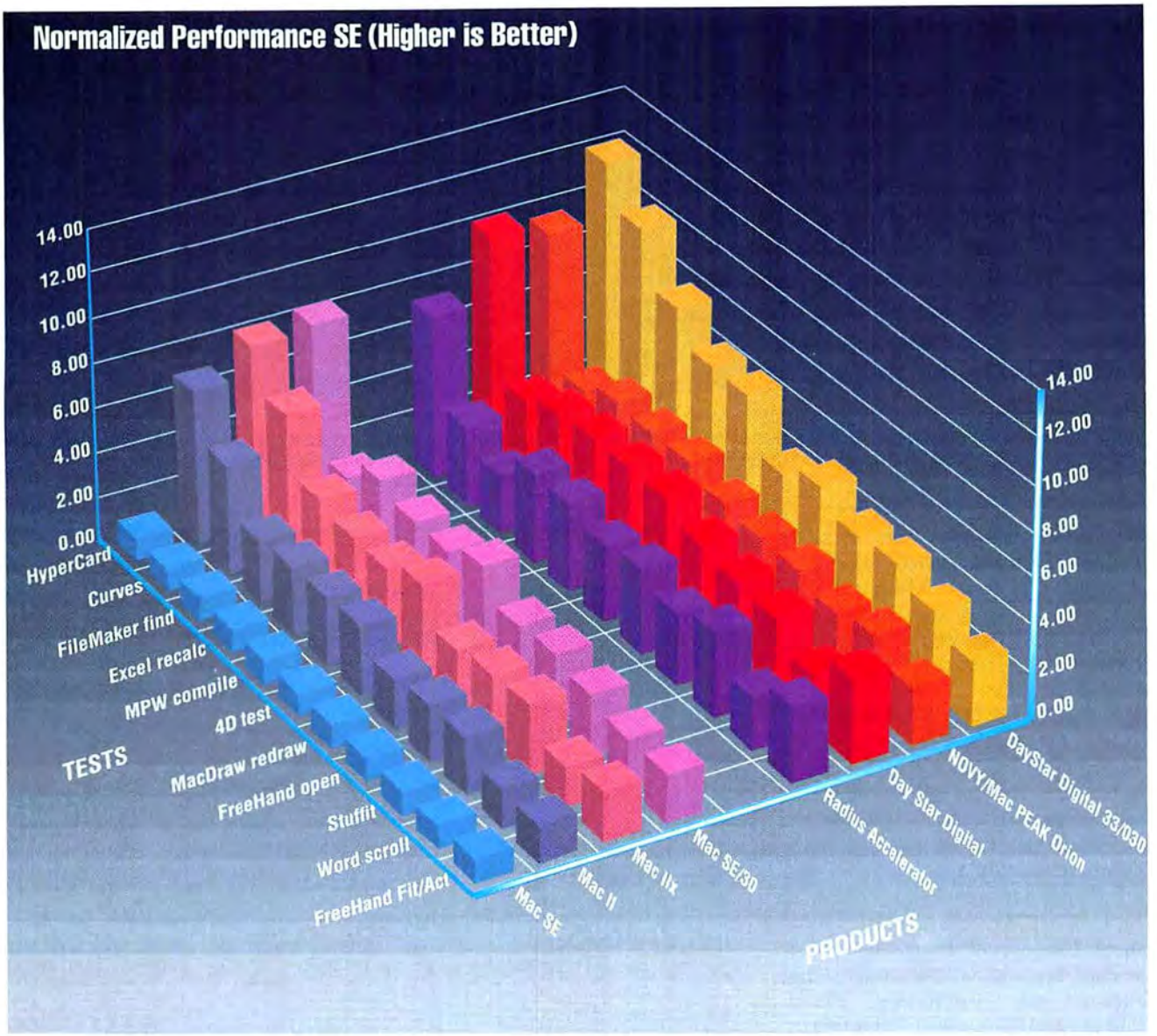
Pending standardization by AT&T, the C++ language, which will come with MPW 3.0, will give C programmers the object-oriented programming paradigm. Until now, this has been reserved for MPW Pascal programmers. The C++ release will be a "precompiler" that outputs a token stream to the C compiler.

Another major enhancement is SADE, the Standard Apple Debugging Environment. SADE offers source-level debugging for MPW languages in addition to extremely powerful scripting capabilities. Essentially, SADE contains its own programming language. For those people familiar with the MPW Shell, SADE can be described as an MPW Shell designed for debugging. It is not meant to supersede MacsBug, rather to provide higher-level debugging facilities and a more comfortable debugging environment.

MPW 3.0 also includes a sophisticated source code management system, Projector, which allows large programming projects that involve many different programmers working with many different source files to be organized in a coherent fashion. Using the metaphor of a library, source code can be "checked out" and worked on by only one programmer at a time. Never are two programmers working on the same source file, although more than one programmer at a time can have read access to the same file. Projector tracks all changes to files and enables any version of the software to be reconstructed easily.

You can get more information on the pricing and availability of MPW 3.0 by calling APDA, the Apple Programmer's and Developer's Association, at (800) 282-2732.

— Stephan Somogyi



	Word scroll	Unstuff StuffIt file	FreeHand Open	MacDraw redraw	4D test	MPW Compile	Excel recalculation	FileMaker find	Curves	FreeHand Fit/Act.	HyperCard
1-Mb Mac SE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4-Mb Mac II	1.68	2.54	2.45	2.18	3.13	2.10	2.98	2.79	4.87	1.63	6.84
4-Mb Mac IIx	1.79	3.09	2.93	2.60	4.10	2.33	3.47	3.87	6.38	2.21	8.12
4-Mb Mac SE/30	2.19	2.68	3.01	2.84	4.10	2.11	3.43	3.96	2.73	2.14	8.38
4-Mb Radius Accelerator 25 SE	2.29	3.68	3.10	3.75	3.43	1.75	4.00	2.64	3.57	3.32	7.26
4-Mb MacPEAK Orion SE 25	3.26	2.96	3.43	3.50	3.70	2.35	4.29	4.35	3.66	2.44	9.53
NOVY/DayStar Digital Mac20MX-25	2.45	3.55	3.71	4.02	4.81	2.61	4.82	4.59	3.95	3.70	10.14
DayStar Digital 33/030 (Mac II)	3.59	4.26	4.15	5.03	4.27	2.68	6.49	7.84	10.25	2.74	12.03

In testing the performance of the SE/30, we compared it with the standard SE, Mac II, Mac IIx, and several accelerator boards. Through an assortment of tests, ranging from a HyperCard sort to a MacDraw redraw, the SE/30 performed better than a Mac II and about as well as the IIx. The strangest anomaly occured in the Curves test, a floating-point–intensive graphics application, which ran considerably slower on the SE/30 than on a Mac II or IIx. Even Apple's engineers were mystified.

All results are normalized to the performance of a Mac SE (generally speaking, the taller the bar, the better the performance). SE performance in every case equals one; if the performance of another machine is shown as two, it means it ran twice as fast as the standard SE. Precise numbers are listed in the accompanying chart.



The SE/30 motherboard sports a 68030 CPU which, along with the IIx ROMs, establishes a new hardware platform for Macintosh computers.



Because of the new design of the motherboard, cards that fit into the SE will not work in the SE/30. Among the new cards available for the new machine is this Spectrum/SE from SuperMac. The Spectrum/SE supports Apple's 12-inch gray-scale and 13-inch color monitor along with SuperMac's 19-inch gray-scale and Spectrum color monitors.

the installed base of Mac Plus and SE users. Yeah, yeah, I know — as long as they keep selling.

Don't get me wrong. I think this new box is a master stroke (although I would heap decidedly less praise on Apple's decision not to simultaneously offer an 030 Direct Slot video card for its own monitors). The SE/30 may not be a laptop, but it is a portable IIx. The SE/30 crams the processing power of a 68030/68882 and scads of memory into a small box that travels easily and still lets you hook up a large-screen gray-scale or color monitor at the office. If you need lots of slots, this isn't the machine for you. But if you don't need the benefits of the NuBus, it's a winner. It's also a good choice as an AppleShare server.

Some people might think it would be a good choice as an A/UX workstation. Unfortunately, those people aren't the ones making decisions at Apple. Although the company simultaneously announced the first major upgrade to A/UX, version 1.1 (see A/UXiliary Information in this issue), they did not announce that A/UX 1.1 would run on the SE/30. And for good reason. It won't. Maybe someday.

So how much is an SE/30 going to cost you? The HD40 model goes for $5,069—*which is exactly what the old SE, similarly configured, used to cost.* The HD80, with 4 megabytes of RAM, will set you back $6,369.

030 ENVY

Want one, but you already have an SE? There will be an upgrade, available in March, but the details — price, for example — weren't available at press time. It's expected to come in two parts. First, there's the logic board and chassis swap (that's one). You need a new chassis as well as a new motherboard because of the layout of the 030 Direct Slot.

You get 1 megabyte of RAM on your new logic board. But Apple couldn't tell us whether you'll get to keep the megabyte that came on your original SE board, or have to send it back.

The second part of the upgrade is the FDHD floppy drive. The logic board and chassis can be upgraded by themselves, and the old 800K drive will still work fine. But you must have the new motherboard to get the new floppy drive, because the chip that controls it isn't on the old SE motherboard.

So with the SE/30, Apple is providing a clear upgrade path. If you want Color QuickDraw, you can get it. If you want more speed or power, you can have that, too. Perhaps the most important point of the advent of the SE/30 is that Apple is moving to this new generation of machines while maintaining the same footprint. That's right. Apple does understand, with all the changes it is making in hardware, that it still needs to maintain the element of familiarity. The more things change, the more Apple needs to keep at least a few things the same.

WHILE APPLE PRIDES ITSELF ON THE SMALL FOOTPRINT OF ITS SE/30, SENIOR TECHNICAL WRITER HENRY BORTMAN HAS MANAGED TO FILL HIS DESK (AND CONSEQUENTLY HIS OFFICE) WITH SO MANY HARDWARE PERIPHERALS THAT HE CAN NO LONGER LOCATE HIS OWN MAC.

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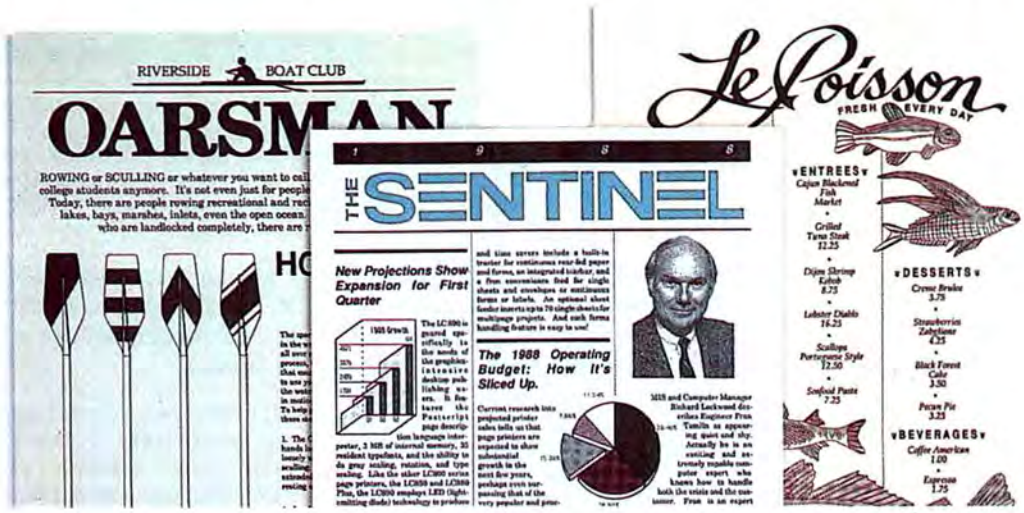
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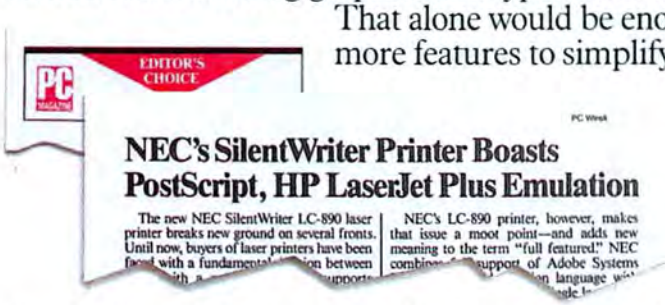
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DTP

■ Edited By
Aileen Abernathy

This month DTP focuses on graphics. We help you sort through the alphabet soup of graphics formats in "Putting It Graphically," the first of a two-part series. Then we round up the latest clip art in Between the Lines.

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■ ■ ■ ■ ■ ■ ■

If you have a few tricks of the trade to share, send them to DTP, c/o *MacUser*, 950 Tower Lane, 18th floor, Foster City, CA 94404.

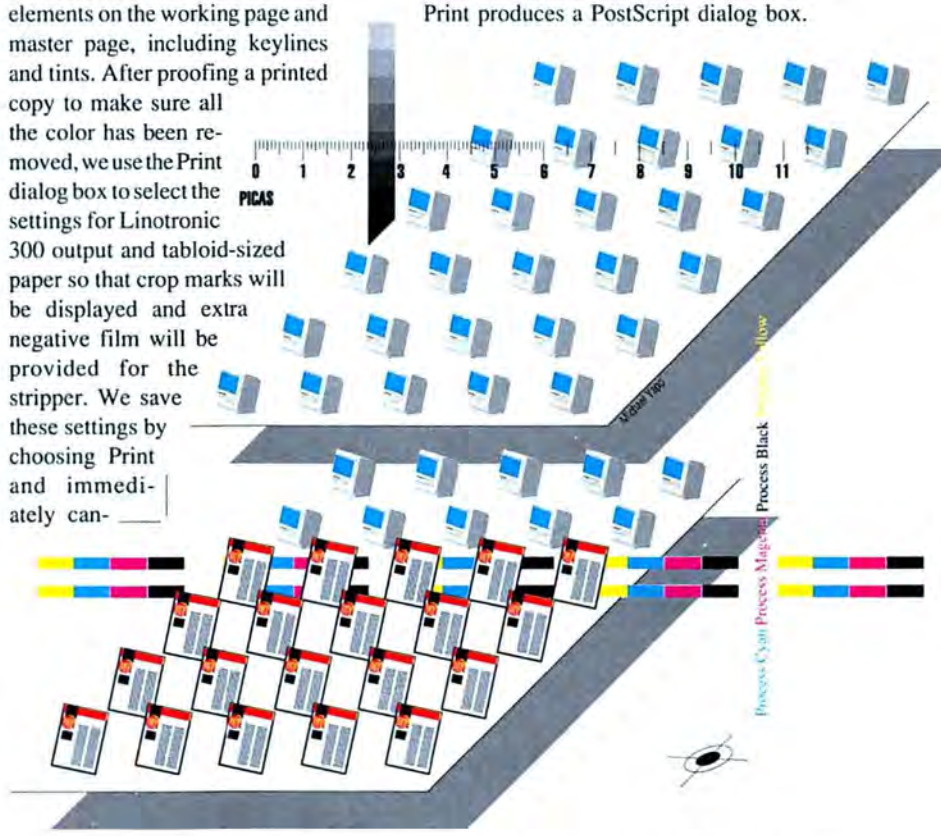
BETWEEN THE LINES

From the Desktop

The page-layout program we use at *MacUser* is PageMaker 3.0. Since PageMaker can't handle process color, you may well ask, how can we use it to produce a four-color magazine? Good question. Each finished page is saved as two files — a PageMaker file for text and an EPSF file for color elements. The actual four-color separations are then performed in Adobe Separator (Illustrator 88's companion program). Here's a step-by-step look at how we ready a magazine page for printing from the desktop.

First, each page is saved as a separate PageMaker document. Next, we create a PageMaker file containing just the text elements (otherwise the text would be color-separated along with the artwork). To do this, we remove all the color elements on the working page and master page, including keylines and tints. After proofing a printed copy to make sure all the color has been removed, we use the Print dialog box to select the settings for Linotronic 300 output and tabloid-sized paper so that crop marks will be displayed and extra negative film will be provided for the stripper. We save these settings by choosing Print and immediately canceling the job. The page is then saved as a new PageMaker document named *name*Type. This file can then be printed directly to negative film on the Linotronic.

To process the color elements, we reopen the original PageMaker file and remove all type and black lines on the working and master pages. The page is proofed on glossy paper to ensure that even light tints show up and is then saved as a PageMaker file called *name*Color. This file isn't needed for the color separation process, but it serves as a backup in case something goes wrong. Using the Print dialog box, we save the page again as an EPSF file, making sure that the options for crop marks, tabloid size, and the Linotronic 300 are checked. Holding down the Option key while clicking on Print produces a PostScript dialog box.

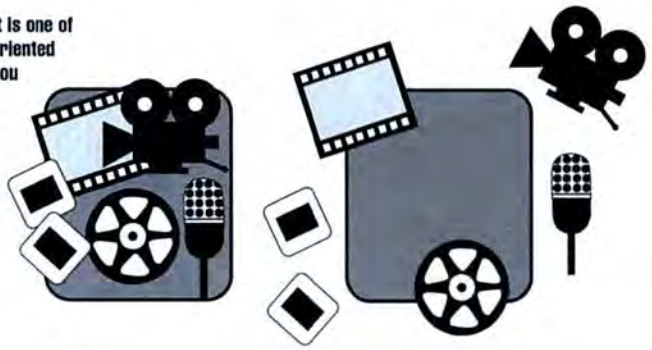


All options are turned off except for the EPSF button and "Print PostScript to disk." The filename is set to *name*EPSF and saved (by clicking Print) to disk.

The resulting PostScript file contains all the cyan, magenta, yellow, and black (CMYK) information about the page. The file is color-separated with Adobe Separator, and the separations are printed to film on the Linotronic 300. The stripper can then combine the two black negatives (text and graphic) with the cyan, magenta, and yellow negatives to create a four-color print job.

That's how we produce magazine pages (like this one) from the desktop. Next time, we'll have some tips for handling memory-intensive graphics, including halftones.

■ **Aileen Abernathy**



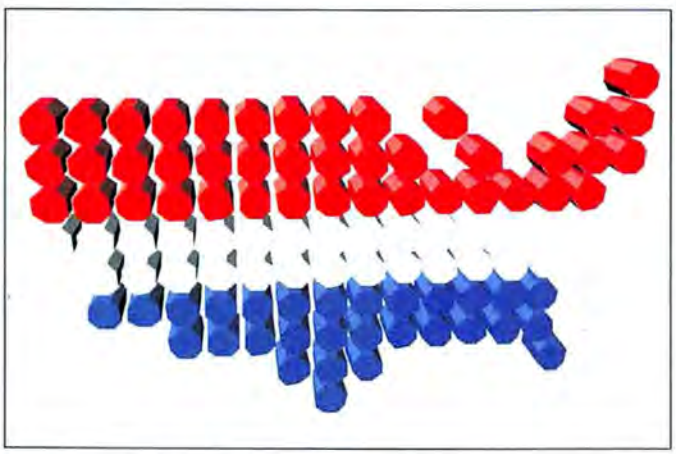
Images With Impact is one of several business-oriented packages that let you edit images to suit your needs. Here, the original image (left) has been pulled apart using Illustrator 88; each piece could then be used separately.

For Art's Sake

Since the roundup of EPSF clip art in our August '88 issue, we've been buried under an avalanche of new products. Here's a sampling of new clip-art packages, some of which will be reviewed in upcoming issues.

• **Clip3D** is 3-D, it's in color, *and* it comes bundled with a program that lets you rotate, distort, merge, zoom in on, or add perspective to the images. The original images are Pro3D files, but they can be exported from Clip3D in various formats (Paint, PICT2, TIFF, and EPSF). Eight packages ($99 each) are available, with varying themes (such as fonts, geography, business, and people). Contact Enabling Technologies, 600 S. Dearborn St., Suite 1304, Chicago, IL 60605; (312) 427-0386.

• **Images With Impact, Business I** is the latest EPSF offering from 3G Graphics. This collection of 170 illustrations ($129.95) shows the same attention to detail as the previous Graphics and Symbols package, including the pregrouping of images, so you can easily move or eliminate their component parts using Illustrator or FreeHand 2.0. Also available from 3G is the Art of Persuasion, a collection of over 100 PICT images included with Persuasion, Aldus' new presentation software. Contact 3G Graphics, 11410 N.E. 124th St., Suite 6155, Kirkland, WA 98034; (800) 456-0234 or (206) 823-8198.



Clip3D has color and depth, and you can customize it.

• **Cliptures** is business-oriented EPSF clip art from Dream Maker. Volume 1, Business Images (retailing for $129.95), contains 147 high-resolution illustrations on four 800K disks. These clean, professional-looking images can be used as is or can be edited with Illustrator or FreeHand. Volume 2, More Business Images, should be out as you read this. Contact Dream Maker Software, 4020 Paige St., Los Angeles, CA 90031; (213) 221-6436 or (800) 876-5665.

• **Vivid Impressions!** contains some of the first color EPSF clip art. The debut collection, Special Events, contains 130 images — including more than 15 color montages — on six disks for $130. The modular images can be edited in Illustrator or FreeHand 2.0. Contact Casady & Greene, Box 223779, Carmel, CA 93922; (408) 624-8716.

• **Works of Art Laser Art,** from Springboard Software, is a business-oriented package containing over 125 EPSF images for $99.95. Springboard also has several Works of Art collections of bitmapped art in both HyperCard and MacPaint formats ($49.95 each). Contact Springboard Software, 7808 Creekridge Circle, Minneapolis, MN 55435; (612) 944-3915.

• **Adobe Collector's Edition** ($125) is an excellent EPSF selection of 280 dingbats, 65 borders, and two editable alphabets. All the graphics are Illustrator outline files, which you can embellish to your heart's content. Contact Adobe Systems, 1585 Charleston Road, Box 7900, Mountain View, CA 94039; (415) 961-4400.

• **Hi-Tech Backgrounds** ($89.95) features 12 beautifully rendered background grids, horizons, and spheres in EPSF. These backgrounds can be combined with text and graphics to give a professional look

to any publication. Contact ARTfactory, c/o PageStation Network, 414 Tennessee St., Suite A, Redlands, CA 92373; (714) 793-7346.

• **DeskTop Art** is a monthly collection of about 40 thematic EPSF images. Join the Designer's Club and you get each package for $49.50; nonmembers pay $74.95 per package. Contact Dynamic Graphics, 6000 N. Forest Park Drive, Box 1901, Peoria, IL 61656; (309) 688-8800.

• **PresentationArt** by Image Club Graphics contains more than 300 images in PICT format for desktop presentations. This wide-ranging collection, which includes EPSF formatting, costs $199 for the three-volume set or $99 per volume. Image Club, which also markets DigitArt, can be reached at 2915 19th St. N.E., Calgary, Alberta, Canada T2E 7A1; (403) 250-1969.

• **Metro ImageBase** ships its clip art of the same name in TIFF. The theme-oriented packages, which cover topics ranging from holidays and sports to the business world, contain 100 images each, digitized at 300 dpi. The company has been supplying advertising art to newspapers for 75 years, and the graphics in the 14 packages available ($145 each) were culled from its inventory of more than one million images. Contact Metro ImageBase, 18623 Ventura Blvd., Suite 210, Tarzana, CA 91356; (800) 525-1552 or (818) 881-1997.

• **Centennial Classics** contains more than 500 illustrations from the nineteenth century. The images were scanned at 300 dpi from original woodcuts, drawings, and engravings. The Curator-compatible 37-volume set is available in several formats for $650, or for $19.95 per volume. Contact New Edge, Inc., Noone Falls, Peterborough, NH 03458; (800) 284-3330 or (603) 924-9100.

• **WetPaint,** the bit-mapped clip-art series from Dubl-Click, keeps rolling along. Recent releases include Island Life ($79.95) and MacTut ($49.95), a collection of Egyptian clip art that includes ProGlyph, a series of hieroglyphic font families. Contact Dubl-Click, 18201 Gresham St., Northridge, CA 91325; (818) 349-2758.

• **Graphics Warehouse** is a smorgasbord of more than 20 megabytes of bit-mapped art of varying quality. Nearly three dozen disks cover everything from celebrities and transportation to M.C. Escher. Organized in four-disk sets ($19.95 each), the collection is available from Showker Graphic Arts & Design, 15 Southgate Court, Harrisonburg, VA 22801; (703) 433-8402.

• **Pal, the Professional Art Library** is a massive collection of EPSF graphics from Multi-Ad Services. First released on CD-ROM a year ago, the art is now available on disks for both the Mac and PC. The initial offering, Potpourri, contains 300 images in 12 categories. It sells for $149.95 on CD-ROM, and it's $189.95 for the 23-disk set. Contact Multi-Ad Services, 1720 W. Detweiller Drive, Peoria, IL 61615; (309) 692-1530.

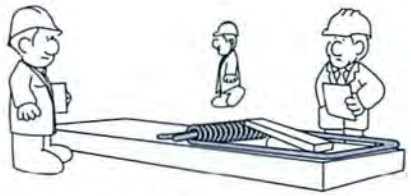
■ **Aileen Abernathy**

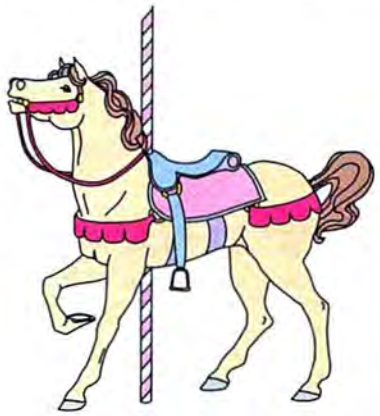
TIP

Clip and Paste

EPSF is rapidly becoming the clip-art format of choice for many desktop publishers. But EPSF graphics do have one drawback: They can't be imported into most word-processing programs or be cataloged by PictureBase, the art-management program from Symmetry. You can circumvent this restriction, however, through a little-known option in Adobe Illustrator.

Use Illustrator to open the desired clip-art file. Then choose Select All from the Edit menu and hold down the Option key while choosing Cut or Copy. This causes both EPSF and PICT information from the image to be transferred to the Clipboard. You can then paste the art into any program that accepts PICT, but not EPSF, files. The entire process is explained in PictureBase Technical Note No. 4, available from Symmetry, 761 E. University, Mesa, AZ 85203; (602) 844-2199.









From the top: Cliptures offers business art with a cartoon flavor; Vivid Impressions! mixes color clip art with traditional black-and-white images; Works of Art shows people in business situations; Adobe Collector's Edition contains a wide variety of borders and dingbats.

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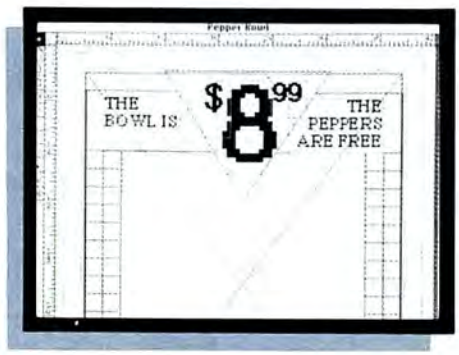
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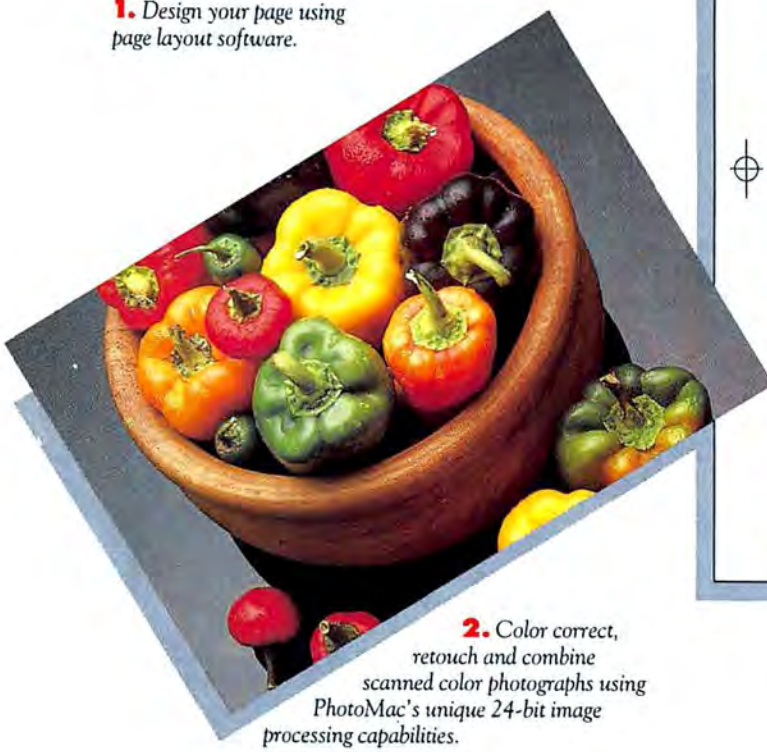
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Putting It Graphically

If PICTEPSFTIFFPICT2 looks like one word to you, or you think the only difference between Paint and PostScript is the spelling, read on.

Part 1 of a two-part article.



WALTER JEBE II

Once upon a time, moving images between applications was as predictable as sunrise. There were two (count 'em) formats for storing Mac graphics: PICT and Paint. Then along came scanners, gray scale, color, and a plethora of imaging options. The onslaught of new file formats for storing and transporting sophisticated images could confuse even the most hardened graphics guru. In Part 1 of this two-part guide, we discuss the various kinds of graphics and their storage formats, uses, and limitations.

First, let's distinguish between a file format, such as PICT or Encapsulated PostScript Format (EPSF), and the various types of graphics (bit-mapped, object-oriented) that applications can produce. A *file format* is the structure of the data used to record an image onto a disk. The same data structure can be used to record various types of graphics, and a given type of graphic can be stored in several data structures. With every combination of file format and graphic type, there are advantages and trade-offs that may not be apparent even to the seasoned mouser. Most graphics applications can now import and export images in several formats. Page-layout and presentation programs are forever under the upgrade surgeon's scalpel, gaining the abilities to read, scale, crop, display, and print the latest kinds of image files.

Explaining a Bit

One of the two basic types of graphics is the *bit map*. Its real-world analog is a painting, or more appropriately, a mosaic made from tiny colored tiles. In a bit-mapped image, the tiles are called picture elements, or *pixels*. Lines are depicted as rows of adjoining pixels, and all shapes are both outlined and filled with pixels.

For black-and-white bit maps, only one data bit is required to describe each pixel. Gray-scale and color graphics created by applications like PixelPaint and Studio/8, or photo-retouching programs like Digital Darkroom and ImageStudio essentially look and act like

By Salvatore Parascandolo

bit maps. However, a single bit per pixel doesn't provide enough information to specify a particular color or shade of gray. Images containing 256 grays or colors require 8 bits per pixel, and photographic-quality, full-color images require as many as 24. Thus, color and gray-scale files can occupy a vast amount of disk space.

As in a mosaic, you make changes by replacing tiles of one color with tiles of another color. The illusion of nonexistent colors or grays is achieved by *dithering*, or mixing, tiles of the available colors or gray shades. The mosaic nature of a bit map causes some unpleasant effects whenever an area of the graphic is moved, enlarged, or rotated. Moving part of a bit map entails literally ripping tiles from the surface and moving them elsewhere, leaving a hole (no tiles) behind. Wherever the shifted image lands, it replaces the tiles that were there, permanently erasing the overlaid portion. If you enlarge a bit map, it looks as though you replaced the small mosaic tiles that originally formed the image with larger tiles, resulting in a blocky and jagged appearance. Rotating part of a bit map rips the affected area off the surface and also causes the component tiles to shift slightly, producing a crumbly looking image.

When printing a bit map, printers (regardless of their resolution) are forced to reproduce the image exactly as it is stored, in its tiled form. The effective resolution of the printed image is directly dependent on the resolution of the bit map. Coarse bit maps print coarsely; fine bit maps print finely. Early MacPaint bit maps had 72 pixels per inch (ppi), but newer applications like Canvas, Cricket Paint, and SuperPaint can paint at 300 ppi and even higher resolutions (very small mosaic tiles), which lets you take advantage of higher resolution printers.

I, Object

Object-oriented graphics — like those produced with MacDraw, FreeHand, and Illustrator — overcome the limitations of bit maps in several ways. First and foremost, they are composed of mathematically described *objects*, as opposed to bit maps, which are collections of dots (see Figure 1). Object-oriented applications don't store your strokes as a collection of tiles on a surface, but rather as a list of drawing instructions compiled from your menu choices and mouse movements. Everything you draw, move, or change updates an internal database that lets the program keep precise track of each item on the drawing surface. Thus you can enlarge, reduce, rotate, reshape, and refill objects, and the program will redraw

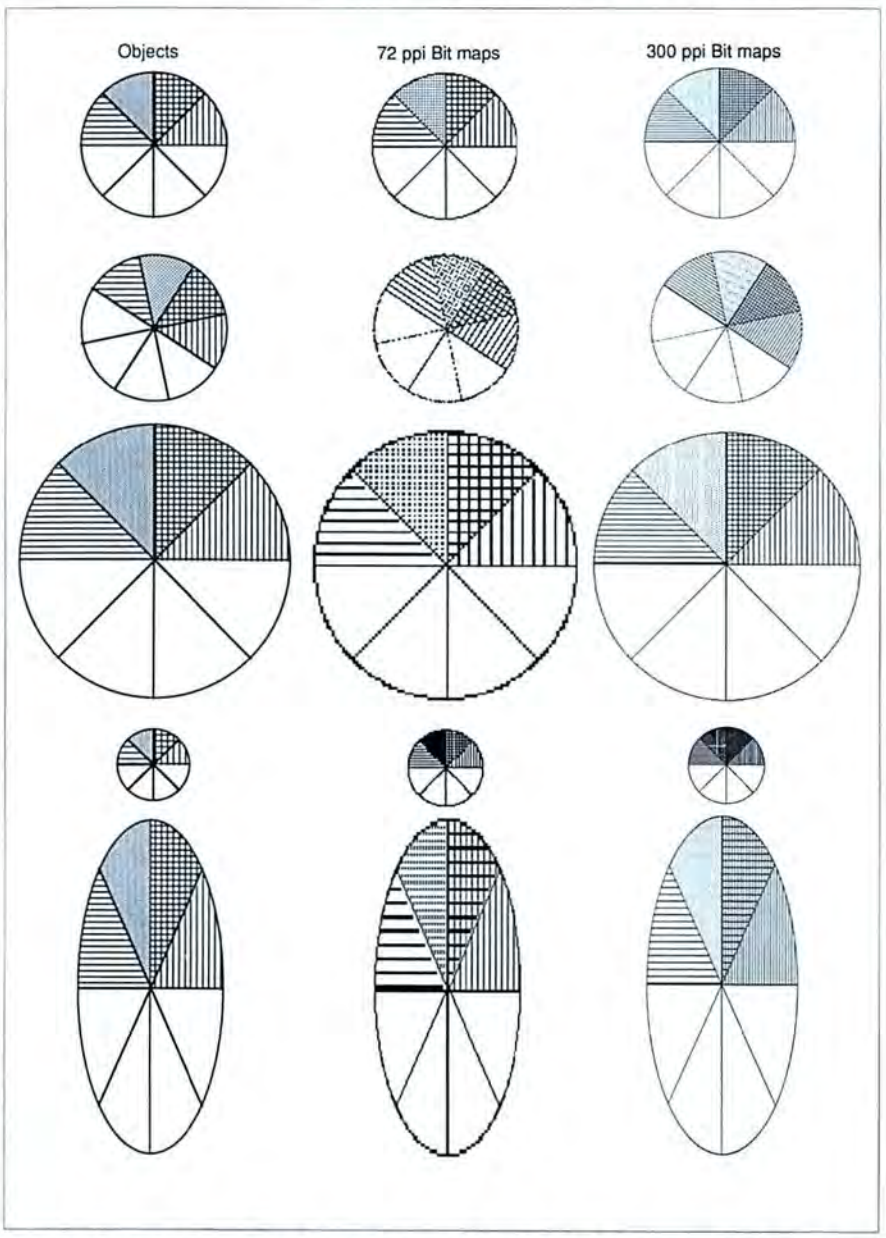


Figure 1: To illustrate the differences between bit maps and object-oriented graphics, we rotated, enlarged, reduced, and distorted an object and two bit maps. The object's lines never changed thickness, and its patterns maintained their size and appearance. The 72-ppi bit map became reliably distorted and ugly, while the 300-ppi bit map took the punishment with better grace.

them in their new state with no loss of quality.

Moreover, objects can be managed individually as if each were drawn on a separate transparent sheet. They are freely movable over the surface of a document and can be stacked and partially hidden by other objects without being permanently erased. They can be grouped into complex arrangements and later ungrouped.

The advantages of object-oriented graphics extend to the printing phase as well. Instead of dictating to the printer where each image spot should be, the program describes the object and lets each kind of printer render the image at its own best resolution. So, unlike bit maps, object-oriented graphics are *resolution-independent*.

What's In Store

A graphics application may be perfectly happy always to save its files in a generic format like PICT or TIFF. If, however, it has some unique imaging capabilities, the program may save graphics in a *proprietary format*, which is loaded with specialized information that (usually) only the creating application can interpret fully (see Figure 2). The proprietary format can be as radical as a new image-storing technique, or it may merely be an existing format that's augmented with data to support the program's special abilities for color management, gradients, effects, layers, or data compression. (Modern Artist, for example, stores images in rPIC, its own variation of PICT.) Be aware that when an application exports an image, converting it from its proprietary format to a generic format, some of the image's special attributes — and thus its flexibility — may be lost.

Now that we've laid the groundwork, here are the file formats, their fabulous features, and their frustrating faults. These are the formats in which most Macintosh graphics applications store or, more importantly, *exchange* their handiwork.

Paint

The Mac's most basic format holds only black-and-white bit maps at 72 ppi. MacPaint, of course, saves in this format, but other applications — SuperPaint, Canvas, Digital Darkroom, ImageStudio, ThunderScan, and PixelPaint, to name a few — have options to save their images as Paint files. Graphics saved in Paint format are stripped of their high-resolution, object-oriented flexibility, gray-scale values, and color.

PICT

PICT (not an acronym) is the oldest generic file format on the Mac. PICT can hold any mix of bit maps and resolution-independent objects. Objects and bit maps can be any of the eight QuickDraw col-

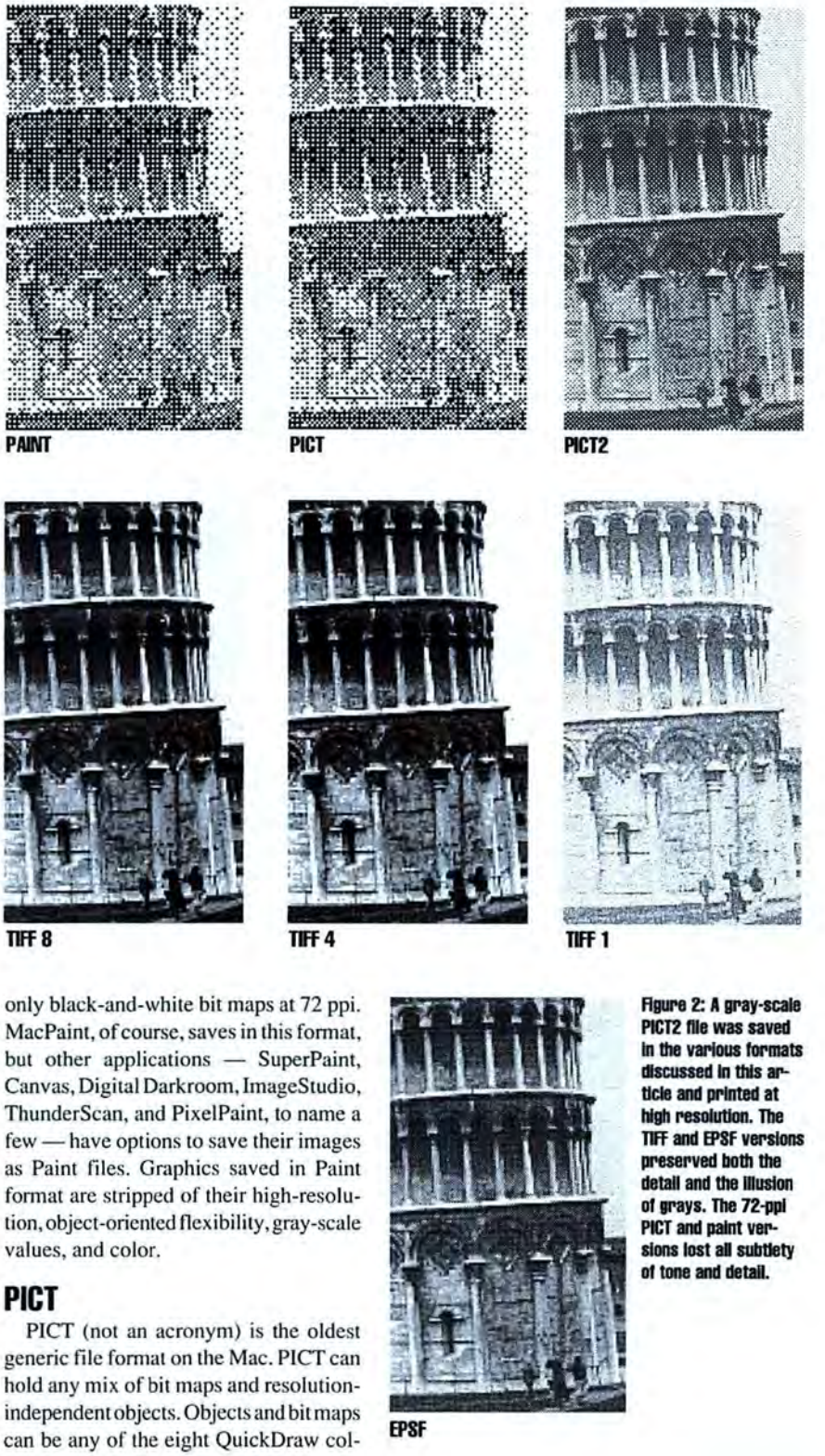
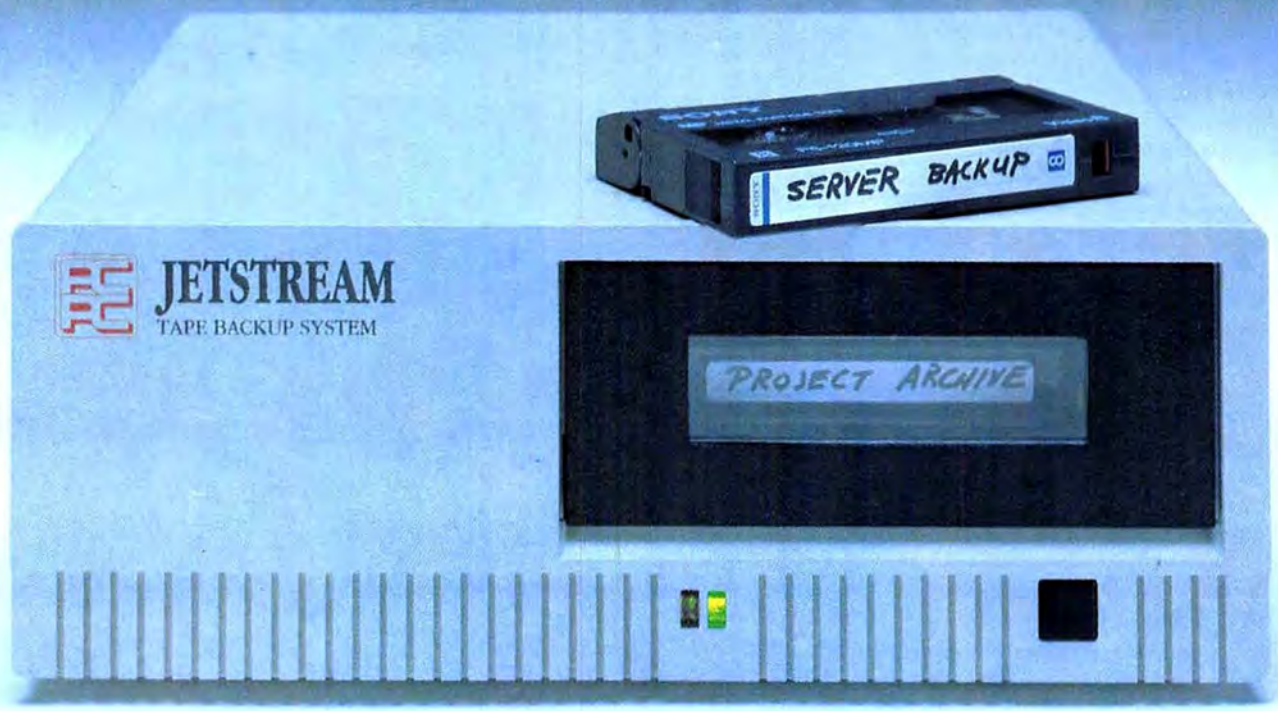


Figure 2: A gray-scale PICT2 file was saved in the various formats discussed in this article and printed at high resolution. The TIFF and EPSF versions preserved both the detail and the illusion of grays. The 72-ppi PICT and paint versions lost all subtlety of tone and detail.

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Format	Gray-scale graphic	Object-oriented graphic
Paint	12K	9K
PICT	11K	2K
PICT2	123K	7K
TIFF (4 bits per pixel)	51K	28K
TIFF (8 bits per pixel)	100K	56K
TIFF (1 bit per pixel)	217K	21K
EPSF	211K	79K

The size of a graphic can vary tremendously, depending on which file format you use to save it. Each type of graphic stores compactly in some formats but not in others. For the results shown here, we used a gray-scale image from Digital Darkroom and an object-oriented graphic created with Canvas 2.0.

ors: white, black, cyan, magenta, yellow, red, green, or blue. PICT can hold bit maps with resolutions greater than 72 ppi, but some applications may convert higher-resolution bit maps to 72 ppi...just because.

PICT2

This is an extension of the PICT format that can hold bit maps and objects with up to 16.7 million colors, including shades of gray. A custom 256-color palette can be saved along with the image data, enabling the original screen appearance to be recreated by any PICT2-wise application. Digital Darkroom and Studio/8 use PICT2 as their standard save format. Some newer applications like Modern Artist offer a PICT-save option that magically preserves original colors or grays, but it turns out that the images are actually saved as PICT2 files. Like PICT, PICT2 has no limit on the resolution of bit maps except that imposed by the creating application.

TIFF

TIFF (tag image file format) is a versatile method for storing bit-mapped images in various resolutions, numbers of grays, or colors. TIFF was created specifically for the storage of gray-scale data, and it's the standard format for scanned images like photographs. However, it cannot store editable versions of object-oriented images.

There is practically no upper or lower limit to the resolution of a TIFF image. In addition, gray-scale TIFF can store an unlimited number of grays, but typically

Offering files in various formats to your applications is an adventure in itself.

256 shades suffice even for high-quality work. As with gray scale, there's essentially no limit to the number of colors TIFF can handle. Although the number of data bits per pixel varies, developers will probably settle on 24 as the standard, which means that a color TIFF file will be about three times the size of a corresponding 8-bit gray-scale file. (Raster image file format, or RIFF, is a gray-scale data-compression scheme used by ImageStudio, but it's not a variation of TIFF.)

EPSF

One EPSF file can contain two versions of an image: a resolution-independent PostScript (text) description that's used for printing on a PostScript device, and an optional, bit-mapped version of the graphic — stored in PICT format — that can be displayed on-screen. This double-image scheme enables page-layout programs to import, crop, and scale high-quality images while using the quick-rendering PICT portion to provide feedback to the user. If an EPSF file has no embedded PICT version of the graphic, the importing application will display a rectangular placeholder to indicate the name, presence, size, and orientation of the image.

During manipulations like shearing, resizing, and rotating, the screen version of an EPSF image may start to look pretty ugly, but the printed version will be fine. If an object-oriented image is saved in EPSF, it will retain its resolution-independent printing quality, but when imported — even into the same application that created it — it can't be ungrouped, refilled, or recolored. It can, however, be resized, distorted, or cropped as the application permits.

PostScript

A PostScript file is a purely text-based description of an image, without the displayable PICT image that EPSF offers. In many applications (PageMaker, for example), pressing Control-F during printing will create a PostScript file of the image. This file can be opened with any word processor and modified (with proper forethought and courage). The PostScript file can then be sent to a print shop for output or fed directly to a PostScript printer, such as a LaserWriter or Linotronic, using a simple downloading utility.

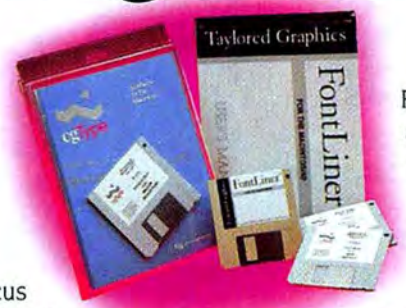
Armed with the foregoing knowledge, you can make more educated choices when you're about to Save or Save As.... But take care. You'll only be halfway out of (or into) the woods. Offering files in various formats to your applications is an adventure in itself. Some applications import perfectly, some semiperfectly, and others exhibit schizophrenic or allergic reactions when dealing with four-letter formats. Part two of this exposé will concentrate on just such phenomena. Stay tuned.

Special thanks to Steve Carlsen, Aldus Corporation's principal software engineer and TIFF guru, and to Ed Bomke of Silicon Beach Software for revealing many of the secrets of the formatted universe.

Salvatore Parascandolo is a MacUser senior staff writer who didn't know how much he didn't know but now knows what he thought he knew and knows he doesn't know it all.

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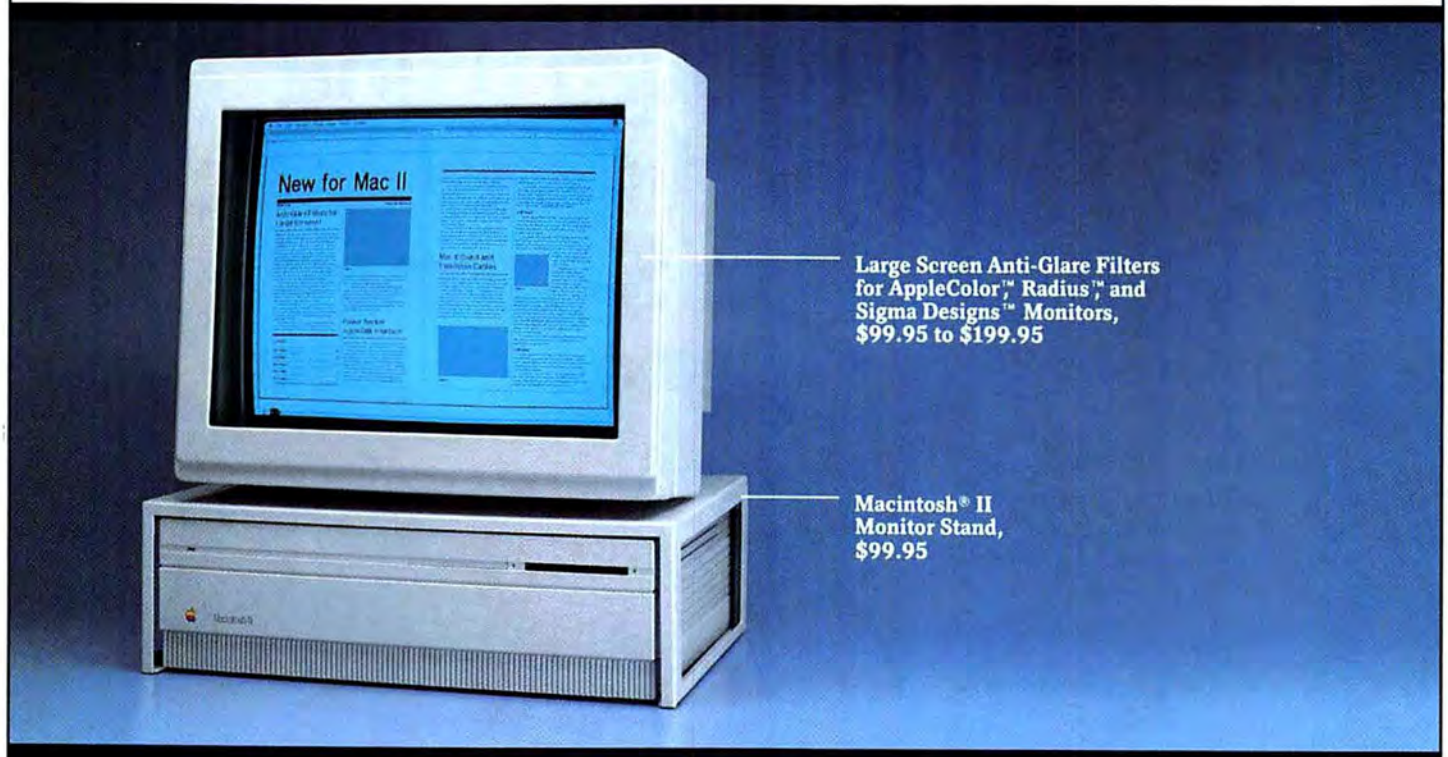
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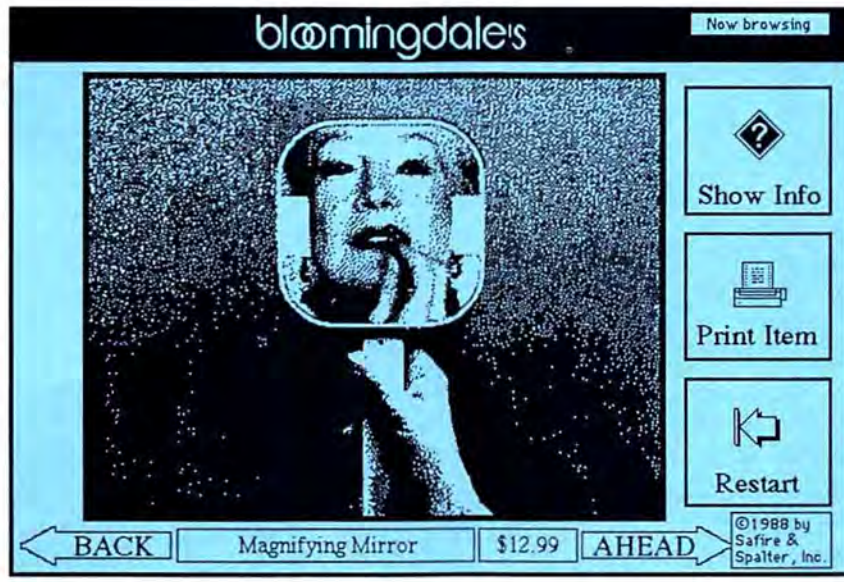
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HYPER SPACE

This month, there's an inside look at a significant new authoring environment, SuperCard, by Silicon Beach Software, which picks up where HyperCard left off. Get a handle on fractals generation and see HyperCard in full flower at Bloomingdale's. There's a tool for weeding out your stacks, and a review of *The Macintosh Bible*'s HyperCard sprout. Interested in learning more about multimedia? There's no better way than with the disk *Discovery by Design*, new from the MacUser Media Lab. For more information, send a SASE to Kristi Coale, *MacUser*, 950 Tower Lane, 18th floor, Foster City, CA 94404.



Mirror, mirror, in the Mac, Show me what's on sale at Bloomies; Here's the card for Interplak — There's plenty more to cure your gloomies.

What's in Bloomie's Windows?

It doesn't look like a Mac and it doesn't have a mouse or keyboard. But inside this box, which looks very much like a bank's automatic teller machine, is a Mac SE, a LaserWriter printer, and a custom HyperCard stack full of information on fancy products sold in Bloomingdale's Advanced Consumer Electronics departments in New York City and Chicago. The Safire Shopper Automatic Retail Machine, by Safire and Spalter Interactive Computing, has entered the marketplace and caused quite a stir.

To start the contraption, you select the type of product you want to see by touching one of 12 buttons (actually, you're activating a HyperCard button through a touch-sensitive panel that overlays the Mac's screen). In moments you're viewing a series of product pictures, many of which are animated using a series of fast-cycling cards. For example, a slot machine spins its wheels, a motorized toothbrush rotates, and time passes on a clock.

When you see something you like, touch another button and a window of information opens up (often accompanied by a short burst of sound or music). If you want a more lengthy product description, touch the print button and out pops a product sheet, hot off the LaserWriter.

Bloomie's customers seem to love it, possibly because it doesn't look or act like a computer, according to Mark Safire of Safire and Spalter.

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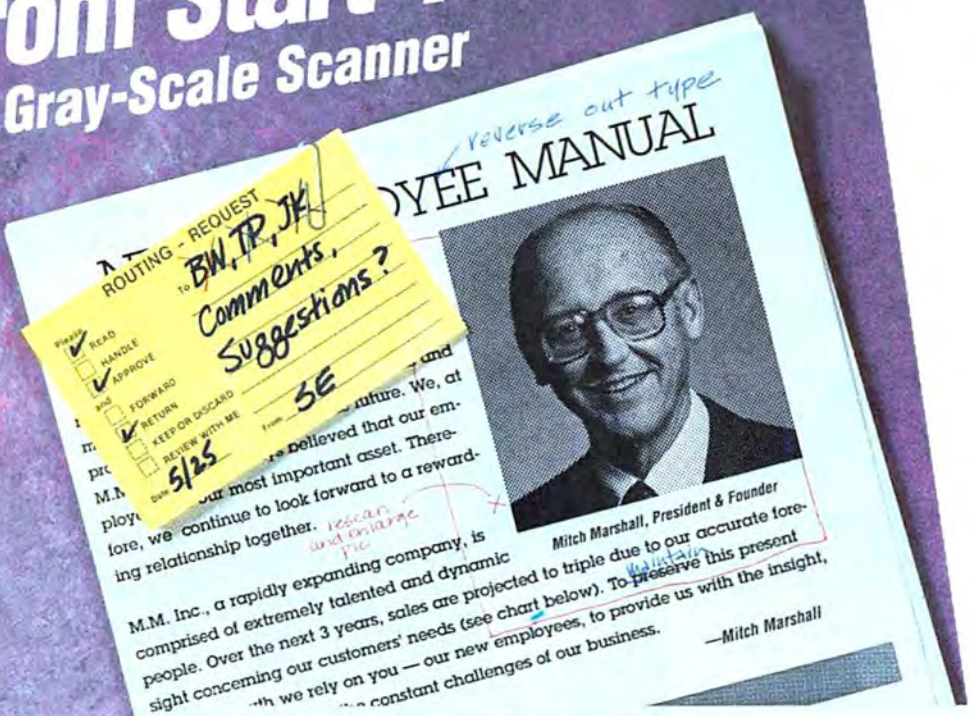


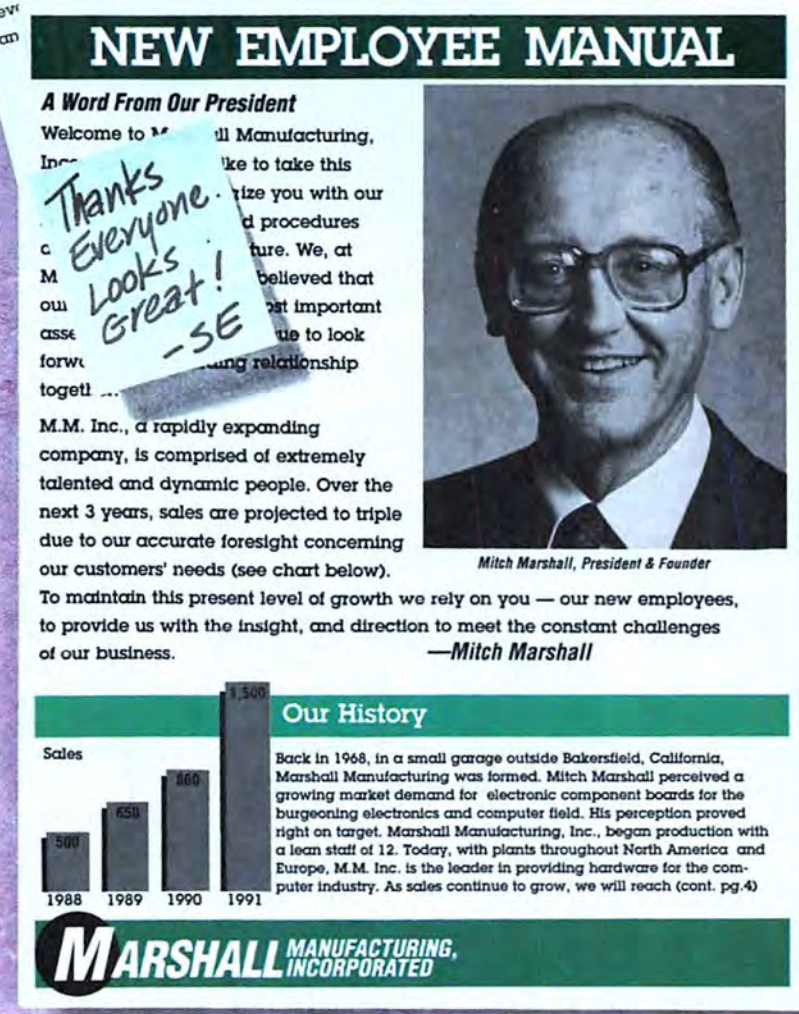
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think this HyperCard creation has a bright retailing future (or, at the very least, to see if some of its features might make their way into your stacks). Or, if retailing is your future and you want to know more about the machine, contact Safire and Spalter at 320 E. 22nd St., Suite 3F, New York, NY 10010; (212) 529-0634.

— *Gil Davis*

Clean Up Your Act

Last week, as I was trying to cram one more dress into my closet, I said to myself, "I can't stand this any longer." Out went all the clothes I would never wear again but had been saving "just in case." The result was a neatly organized closet with all the clothes I needed and space to spare.

This week I was trying to add one more HyperCard stack to a nearly full hard disk and was reminded of my closet. But I wanted to keep all those stacks. I could have transferred some of them to floppies, one way of cleaning house, but I really didn't want to bother. So I sent Stack Cleaner to the rescue.

Stack Cleaner is a set of six utilities from Softworks that simplify the task of developing and modifying HyperCard stacks. You can tidy up your closet, er, disk, with Script Cleaner, which substitutes standard HyperCard scripting abbreviations for full-length commands (such as field, button, and message) wherever possible, thus reducing the size of your stack and often speeding up the application.

Save more than a split second with Split Stack, which utilizes a scroll field to display the cards and backgrounds in a selected stack and then lets you choose those you wish to copy and include in a new stack.

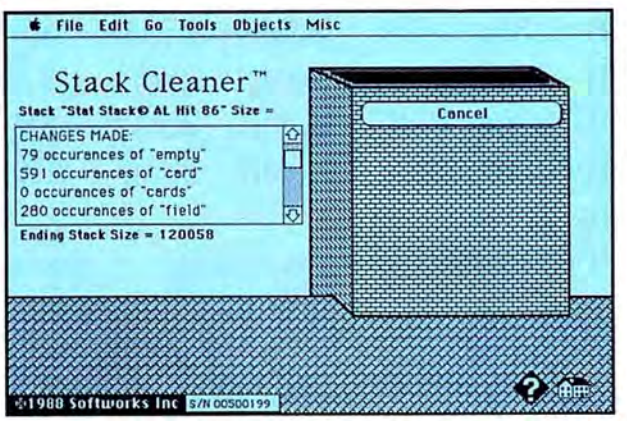
Other utilities that will help you to keep your house in good order and make your life easier are Merge Stacks (merge two stacks to create a new one) and Clone Stack (for copying stacks — a bonus is that it clears unwanted data from cards and deletes duplicate cards). With Menu Maker, you create and modify menus in the menu bar or as pop-up menus; ResCopy, licensed from Apple, lets you copy resources from one stack or application to another.

For more information about these household helpers, contact Softworks Inc. at P.O. Box 2285, Huntington, CT 06484; (203) 926-1116.

— *Laura Johnson*

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The Macintosh Bible: STAX! Edition.

The Macintosh Bible, written by Dale Coleman and Arthur Naiman, is a collection of tips for using the Macintosh more effectively. The first edition of the book, on which the HyperCard edition is based, covers four areas: System software, applications, hardware, and consumer advice. Despite the tendency of the numerous, multioptical tips to clog your mind and dilute retention, the book succeeds because much of the information is truly useful.

Whether the information is gleaned from paper or the screen, *The Macintosh Bible* deserves commendation for a number of reasons. Often books of this genre are sloppy and haphazard — quick and dirty efforts from an author who doesn't take the time to craft a learning tool. However, Coleman and Naiman's work shows a meticulous and heartfelt interest in covering issues that are important to Macintosh users.

The second printed edition of the book is over 700 pages and is culled not just from Coleman and Naiman's knowledge, but from numerous contributors, duly credited, including user groups nationwide. The writing and layout of the book are clean and simple.

Examples of information to be found in *The Macintosh Bible* (all of which are followed by explanations) include: Press the Option key when choosing the Finder's Clean Up command to align icons fully. Never put more than one System on a disk. To approximate the number of words in a document, divide the number of characters by 6. To open the original Mac case, you need a Torx T-15 screwdriver with at least an 8-inch shaft. And, if you're looking to learn your first programming language, you'll learn better habits from Pascal than BASIC.

Many of the tips and tricks in *The Macintosh Bible* relate to particular software programs, such as Microsoft Word, Excel, MacPaint, and PageMaker. Prospective buyers might want to browse through the book to see if the software they use is covered. (Of course, bookstore-style browsing is a feature that most software stores do not allow with their disks.)

The idea for a HyperCard disk-based edition stems from the desire to provide an alternative, if not always better, means of conveying the reference-like information. The direct transfer from book to HyperCard format allows a head-on comparison of how the two mediums deal with textual information.

The disks are lighter and smaller, though the book remains functional when taken to your neighborhood park or on an airplane. To use the disk-based version effectively, you must

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Pop Quiz.

Stop. This is a test. For the next 60 seconds, we will be conducting a quiz about Macintosh® II Videographics. Do not turn the page until you have looked at the visual clue and answered all the questions.

Which Macintosh II graphics card offers the widest range of capture and display resolutions–NTSC, PAL, Apple® Monitor, hi-res, interlaced, non-interlaced and other modes?

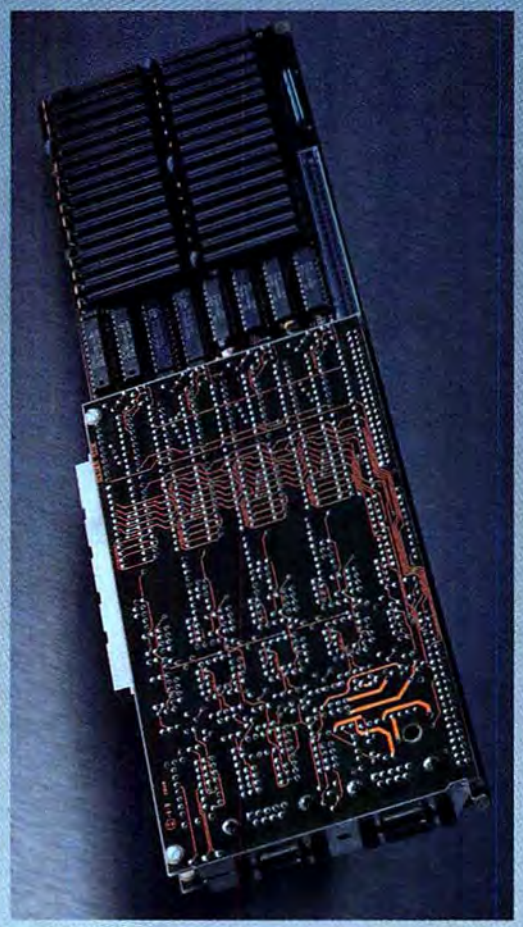
a) NuVista 2M b) NuVista 4M c) All of the above

Name the only videographics card which provides true-color, real-time capture *and* broadcast-quality display while occupying only a single slot in a Macintosh II.

a) NuVista 2M b) NuVista 4M c) All of the above

Which videographics card offers full QuickDraw™ compatibility at 1,2,4,8,16 or 32-bits per pixel?

a) NuVista 2M b) NuVista 4M c) All of the above



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transfer the disk contents onto a hard disk. This takes up nearly 2.5 megabytes of hard-disk space. The book uses an inch of bookshelf space.

The HyperCard interface for text retrieval uses some clever techniques, yet in places it is nonintuitive and graphically uninspired. Ultimately, if the information has been loaded onto a hard drive, clicking on the Table of Contents card and then the Section Contents card index can bring you to desired information in about as much time as using the book's table of contents or index. If you use floppies, the disks are slower than the book.

The Macintosh Bible: STAX! Edition



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Requires: 1 megabyte, two 800K floppy disk drives (hard disk recommended), HyperCard.
Application Size: About 2 megabytes on three disks.
Copy Protection: None

Each of the four sections of the disk-based edition has a Contents card and a pop-up scrolling field that contains keywords and phrases. These keywords and phrases serve as an index to the full text. Subtopic dialog boxes and text-embedded buttons provide added navigation capabilities, though you'll need the help screen or the manual to figure these out. You can also search for text using a version of HyperCard's Find command. The Find command gives you the flexibility to search for nonindexed text, a task which is a royal pain in a book.

HyperCard's arrow keys let you go from page to page, but it's more of a chore to navigate linearly on a small computer screen than to turn pages of a book. Browsing through software is not nearly as efficient as browsing through a book, especially prior to purchase.

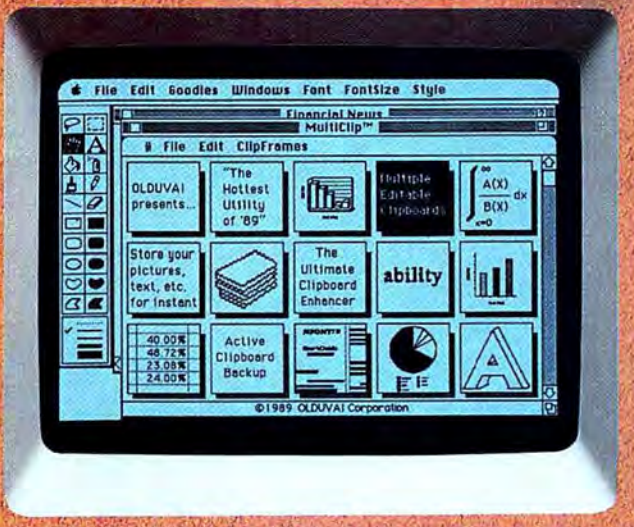
The disk-based version retails for $79.95; the book retails for $24.95. What are you getting for three times the money? In my opinion, a mistake.

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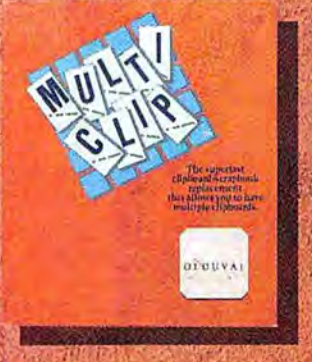
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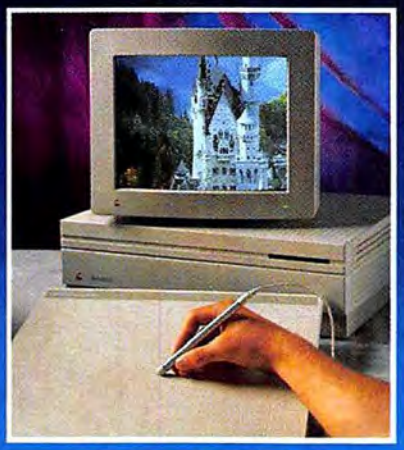
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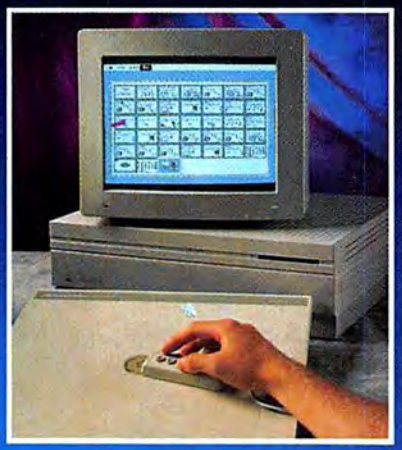
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A Wilder Card

Throw away your HyperCard wish list. SuperCard most likely gives you all you've been dreaming of and a lot more.

BY SALVATORE PARASCANDOLO

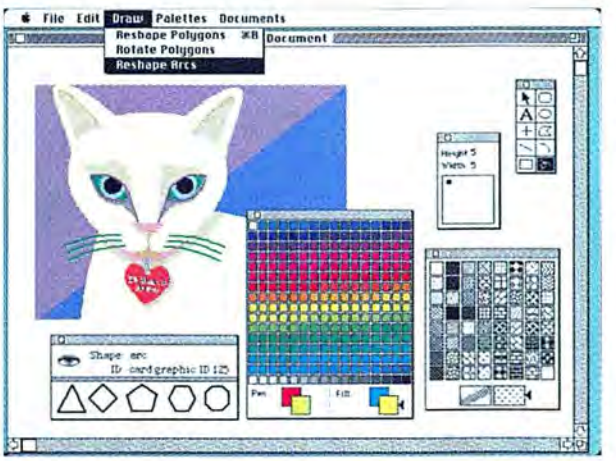
HyperCard offers the essential power of the Mac in a tool with comfortable handles — cards, buttons, fields, and paintings — and to manage it all, a slick programming language that looks a lot like English. HyperCard is soft and smart enough to coax card-based applications from the most unlikely individuals. But those cards are as confining as they are liberating.

HyperCard doesn't let you create genuine-looking Macintosh applications. You can't have your own menus, resizable windows, multiple open stacks, large pages, and objects that you can move around. Nor does it offer decent reports. However clever, valuable, and fun to program, HyperCard stacks are second-class software. They're placed in a subclass — stackware (yuck!), not *real* software, and stackware prices reflect just that.

It was both unlikely and inevitable that someone would develop a better product than HyperCard. Unlikely because HyperCard is free, which is a tough price to beat. Inevitable because the universe naturally responds to mounting pressures and to the outcries of nose-to-the-wall stack developers. Poof! SuperCard appears out of nowhere. This special report is a preview of its power, based on a week of hands-on internship at the offices of its developer, Silicon Beach Software.

HYPERHYPERCARD

SuperCard builds on HyperCard's capabilities, and the HyperTalk language, to give software authors practically full (and full-color) access to the powers and interface features of the Macintosh — the proverbial "all of the



This MacDraw-ish application was written entirely in SuperCard, using its HyperTalk extensions, built-in object consciousness, real menus, and members of its full line of window types.



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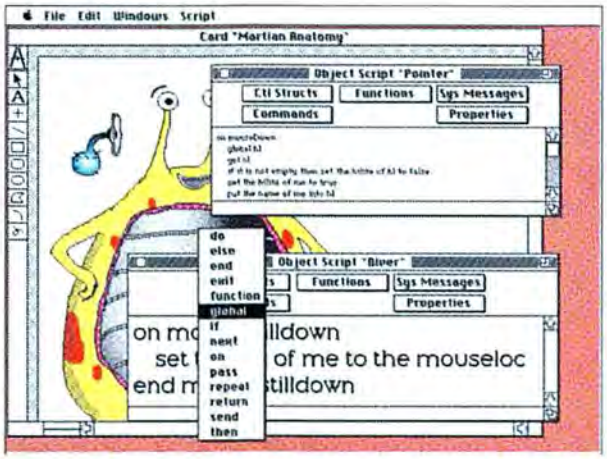


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above." Powerful as SuperCard is, it would be a mistake to dub it hastily the *high-end* or the *color* HyperCard. It can be just as tame as HyperCard, and color is not its only feature. It will run perfectly well on a Mac Plus or an SE.

Moreover, it's neither a HyperCard clone nor a direct competitor. Since HyperCard comes with every Macintosh, we won't see a sudden drop in HyperCard sales. What's more likely to happen is a boost to *Macintosh* sales. Potential developers who find HyperCard too restrictive can now embrace the Mac and SuperCard's wide-open authoring environment. Current developers, already well-versed in HyperTalk, can now pull out all the stops and create some awesome stuff.



You can work with multiple on-screen scripts, in any font you like, from any number of objects, even from different stacks. Script windows have pop-up language elements that you can use for reference, or insert into your script.

WINDOWS, NOT PEEPHOLES

With SuperCard you can build applications that look and feel every bit like any application you pay good money for. Both developers and users should be ecstatic about that. Yes, there are cards, but these can be of any size — as big as billboards if you like. These cards can reside in any of the seven window types that the Macintosh System supports, including scrolling windows, floating palettes, and dialog boxes. You can even change the type and size of windows on the fly, based on the size of the screen, for example, or the longest line of text, or the location of other windows. There are options that allow the user to zoom, resize, and drag a window, depending on its type. You can have any mix of card and window sizes in one file.

Although each window can show only one card at a time, you can have any number of windows open. What's so hot about that? One window may hold clickable tools, another a document on which the tools may operate, while yet another may contain reference information. If you're conducting research, you can browse in one window, then select items from that window and copy them to your collection window — possibilities, possibilities.

PICTURE THIS

SuperCard has a full-featured, full-color, object-oriented drawing environment for creating objects that can be reshaped, resized, restacked, and moved freely throughout the document. Its Paint mode draws on floating easels — which are themselves objects, enabling you to reposition them easily on a card and make them dance to scripted motion. Each graphic, imported or new, can have its own color palette. There are commands to drive speed-controlled color cycling of a specific range of palette colors, providing another tool for conveying information. There are also tools for auto-tracing and gray-scale manipulation. SuperCard will import the same kind of plug-in tools that SuperPaint 2.0 accepts. What's more, it can import PAINT, PICT, PICT2, TIFF and Encapsulated PostScript Format (EPSF) graphics files.

A MOVING SUBJECT

Because everything on a card is a floating object, it can be the subject of animation. SuperCard's Move command lets you relocate an object to a specific place on a card, or shift it relative to its current position and specify how many steps to take along the way. You can instruct any object to move along the points of any polygon or free-hand object, visible or invisible. That's fancy animation with minimal scripting. Future releases of SuperCard look to be far more sophisticated. You can record your animation as a PICS file, which is a multiframe format that can be played back by SuperCard itself, by VideoWorks Professional, and by simple "projector" programs.

HOT BUTTONS

Of course, standard button types are available, with the addition of a *polygon button,* which can be of any size or shape. Any button can be assigned any font, color, or line thickness, and a shadow of variable offset, pattern, and intensity. You can even design your own button icons and cursors for pushing them. If you prefer, you can use anything as a button. For the same object-oriented reasons, anything on a card — including graphics — can be used as a button, with a real script associated with it.

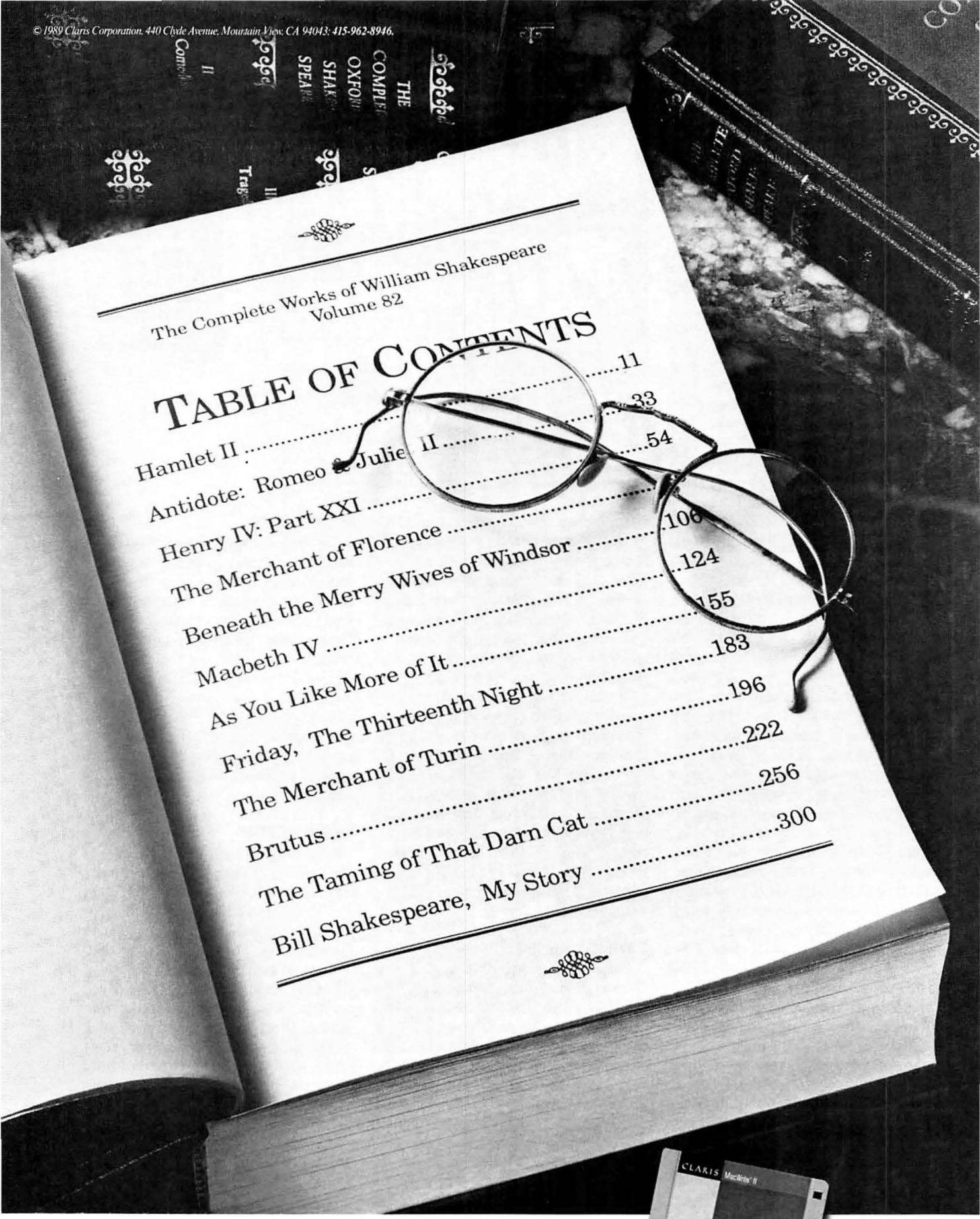
MENU CHOICES

You have full control of menu installation and removal, menu names, text styles, what each menu item does, and whether a menu item is disabled or has a Command-key equivalent. Your menus don't have to play second-banana to some mandatory set, but if you have no menus of your own you can opt to install a supplied set that enables stack navigation and editing, saving files, and the use of desk accessories. You can add to or subtract from those as you see fit, and you can change the menus even as your application is running.

DATABASE POWER

SuperCard lets you have any number of open stacks, and you can operate on any item of any open or closed stack without explicitly opening anything. The opening and closing does occur, but it's handled transparently by SuperCard itself. SuperCard's multi-

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windowing talent simplifies data entry with the use of *forms* whose contents can be distributed among several databases, not necessarily into the card that's initially receiving the input. You can thus have a variety of entry-form cards for the same database or databases.

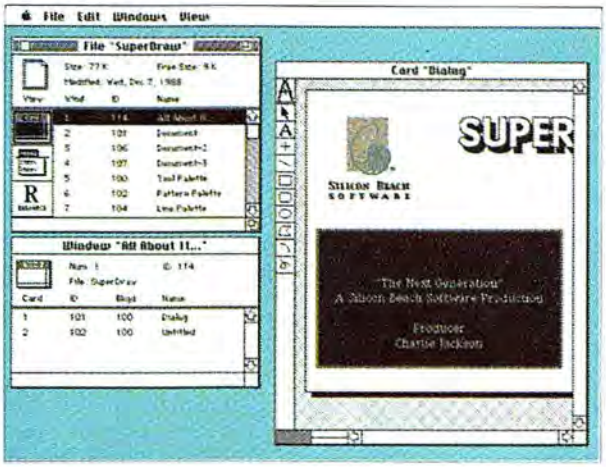
PRINTING

SuperCard unshackles you from HyperCard's limited printing options and its low-resolution bit-mapped graphics. You can now design layouts of practically any size. These layouts can contain graphics and data from several databases, and take full advantage of LaserWriter-quality output. In many cases, SuperCard can serve perfectly well as a page-layout application with automatic page numbering, table of contents, calculation, graphing, and anything else you can script.

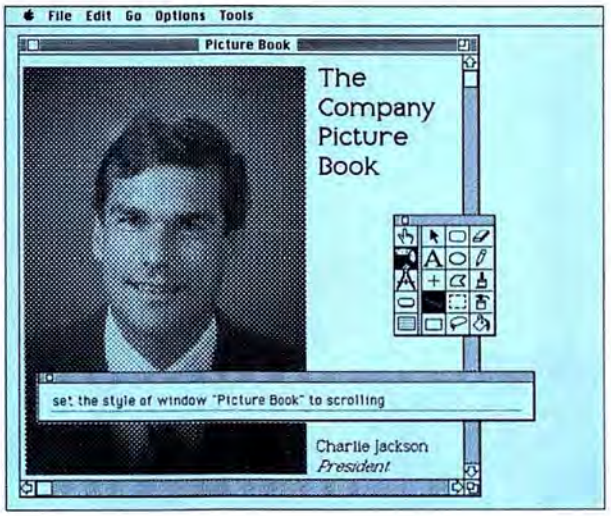
MAKING APPLICATIONS

SuperCard can produce two kinds of applications — those that must run in the presence of SuperCard, and those that can stand alone, requiring no supporting program to run. Stand-alones eliminate problems of compatibility with HyperCard, or even other versions of SuperCard. You'll be able to produce a stand-alone program with its own custom icon and password protection so that users can't modify it, ensuring both its integrity and its value. Silicon Beach requires no license fees for the stand-alone applications you distribute. Users of stand-alone applications don't even need to own a copy of SuperCard.

The SuperCard package actually has two parts — SuperEdit for creating and fully editing an application, and SuperCard for running non–stand-alones. SuperEdit can open multiple SuperCard applications so you can copy and paste components among them. Components can be entire menu sets, windows (and associated cards), scripts, and resources. For editing card objects, there's a selection tool for each object type and a universal tool that can select and operate on multiple objects of mixed types, even if some are on the foreground and some are on the background. Additional welcome features are the *alignment* tool to help card designs look neater, and the ability to group graphic objects and use a single script to control every member of the group.



This editing view of a SuperStack document reveals its components in a hierarchical fashion. High-level classes are Window, Menu, and Resource. Double-clicking any one of these opens its components. Here, the "All About it . . ." window contains two cards, and card Dialog is open for editing.



At run time you can have HyperCard-like menus, full use of desk accessories, and substantial stack-editing capabilities, as this floating tool palette implies. The fully functional palette, by the way, was constructed with SuperCard.

SuperEdit can also import resources from HyperCard stacks, SuperCard applications, and other Macintosh applications. These include tool palettes, menus, icons, cursors, XCMDs, XFCNs, Sounds, and color lookup tables. Imported menus and tool palettes from non-SuperCard applications won't carry their programming with them — you'll need to develop your own scripts for them. SuperEdit can also import a HyperCard stack and output a SuperCard stack of the same initial functionality. This conversion doesn't affect the original stack. All SuperEdit can't do is execute scripts.

RUNNING, MAN

SuperCard, the runner, does all the executing, but it's been wisely empowered with the ability to create and edit scripts, graphics, fields, buttons, cards, and windows. Except for offering script access when an error occurs, the runner has no built-in editing interface — that must be scripted. Luckily, Silicon Beach has already done it for you.

A *script set* can be automatically activated when you run any stack. It gives you HyperCard-like menus, tool palettes, a message box, and a hefty subset of SuperEdit's punch. If this sounds a little roundabout, consider that you can modify that soft-editing environment to work any way you like, developing or buying a new one, or customizing it according to your needs and removing it partially or complete-

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5.25" HH	ST225N	21 MB	65 msec
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THE "C" WORD

On the surface, concerns of compatibility with HyperCard stackware seem well-founded, but they quickly vanish. First, you need only to convert a HyperCard stack to a SuperCard stack if you want to increase its functionality. Second, Silicon Beach assures us that SuperCard will stay abreast of HyperCard developments, maintaining the ability to import HyperCard stacks. Third, even if compatibility is incomplete, several perfectly viable alternatives exist. The obvious option is to continue using HyperCard. Another alternative is to convert stacks to SuperCard and make any necessary one-time adjustments. The final route is to duplicate and improve the functionality of a HyperCard stack in a spanking-new SuperCard stack. As for the other direction, SuperCard's language extensions, higher capabilities, and file formats preclude it from exporting its stacks to HyperCard. But why bother?

WHAT SUPERCARD MEANS TO YOU

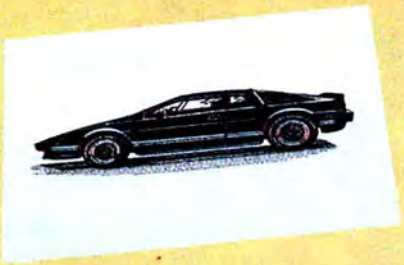
If you're strictly a user, you'll benefit from this new hyperware that does far more, without using goofy workarounds, to compensate for a limited interface. If you're an occasional scripter, you'll find that familiar HyperTalk statements have gained numerous well-integrated SuperCard extensions, and every script window has pop-up menus containing the entire SuperTalk language. You can start with one-window/one-card applications and grow from there in the privacy of your own cerebrum. You experienced scripters, who have already bumped hard against the limitations of HyperCard, can now dispense with the mental wish lists and dust off those shelved project ideas.

Developers of HyperCard accessories, like reference stacks, canned scripts, external commands, and report generators, need not worry. The potential for SuperCard development is vast. There is always a market for software with true utility and a clear, appropriate interface. Not everyone can achieve that, but those who can will have the ideal tool to make and market *real* software. Experts in any field will be able to share their expertise and present their knowledge in practically any form and sequence they choose — without becoming programming hermits. The educational possibilities are immense.

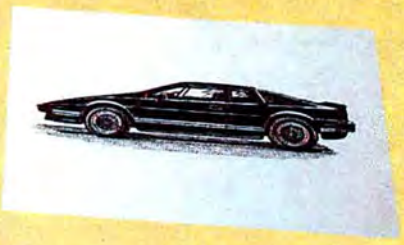
SuperCard should ship in the second quarter of 1989, and will sell for less than $200 — a small price for such a talented artist and capable servant. After all, it even does windows.

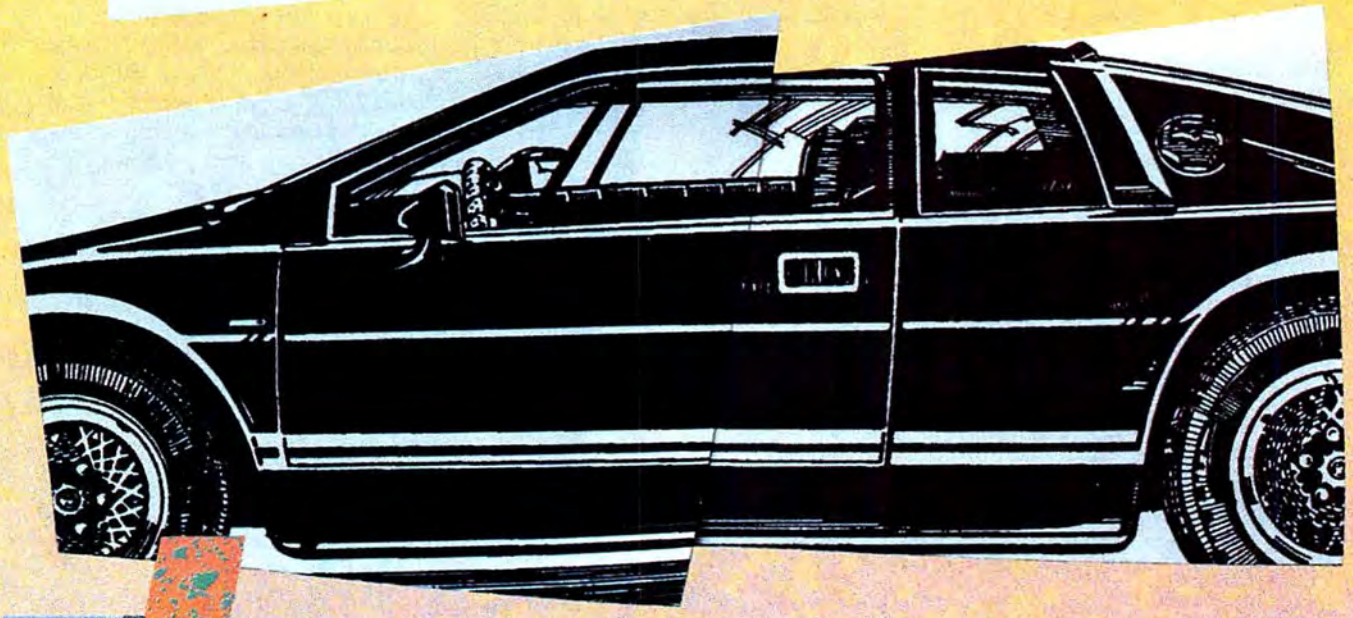


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Fooling Mother Nature with Fractal Flora



In a tuck in the geology of northern California called Lucas Valley, filmmaker George Lucas and a talented band of landscape counterfeiters ply their art. There is an appropriateness, deeper than the prosaic coincidence of a man named Lucas settling in a valley named Lucas, in the conjunction of the rich natural beauty of this site with the mimetic achievements of Lucas' crew.

Lucas Valley's variegated terrain and crazily branching California oaks dangle a challenge before the eyes of Lucasfilm's artists. It is the challenge that nature has always put to the artist who tries to copy natural forms: to capture at one time the complexity and the unity of nature. On the one hand, even the simplest natural form appears to encompass an infinite richness and variety; a tree's branches split into smaller and smaller branches, terminating in leaves as richly brachiated as the tree itself. On the other hand, natural objects also display a tantalizing unity of form; it's clear at a glance that even the most distressed-looking tree grows according to some simple law of symmetry. Yet until recently, any attempt to model a tree with a symmetric form looked phoney.

The mathematical domain of *fractals*, named and charted by Benoit Mandelbrot, is providing a key to understanding these contradictory aspects of natural forms. Mathematicians, physicists, computer scientists, and photographers have contributed to the application of the mathematical theory to what Mandelbrot calls *forgeries* of landscapes and other natural forms. One classic example was created in the labs of Lucasfilm under the direction of Loren Carpenter: the transformation of the planet Genesis in the movie *Star Trek II: The Wrath of Kahn*. But that was seven years ago, and the fractal science/art has advanced in the interim to the point where the best fractal forgeries can pass a visual Turing test. They can pass for Mother Nature.

It is possible to mimic natural forms in less than geological time and on a Macintosh.



BY MICHAEL SWAINE

This verisimilitude comes at a cost: Carpenter has complained that Lucasfilm could not justify spending "twice as much money to improve the quality of the pictures by 2 percent." It takes a lot of computation to generate many levels of a fractal image. *BYTE* magazine columnist Steve Ciarcia recently developed a parallel-processing system and showed how to use the power of parallelism to generate the archetypal fractal image, the Mandelbrot set, a demanding task on a sequential machine.

But it is possible to produce graphics that impressively mimic shrubs, coastlines, and other natural forms in less than geological time and on a Macintosh. You don't need a custom computer to explore what is perhaps the most important development in computer graphics to date, the fractal. Your Mac is up to the task. And you can do it in HyperTalk, starting with the script at the end of this column.

Fractals deal with the contrary aspects of natural forms — infinite complexity and unity of design — by the principle of invariance under changes in magnification. No matter how much you blow up a fractal image, it remains complex; you don't ever get down to the ultimate elements. And the pattern is the same pattern all the way down: The fractal image looks the same, essentially, at any level of magnification. This fact makes it possible to describe the infinitely complex image succinctly, because one simple formula describes its form at infinitely many levels of magnification. Or describes it approximately; the formula only specifies a kind of Platonic essential form, and the fractal artist will typically enrich the realism of the image by introducing randomness within this mathematical design.

This turns out, apparently, to be the right way to do it. It is, apparently, the method nature uses. A line tracing of the coastline of a continent is not distinguishable from a line drawing of a mile of coastline viewed from a low hill, unless you happen to recognize the shape of that particular coastline. The same coastline-generating rule applies at any level of magnification. This same principle of invariance under changes in magnification applies to river courses, mountain ridges, and branching in plants. The deep complexity and essential unity of natural forms are well captured by this principle, and fractals are proving to be the first practical tool for generating convincing forgeries of natural forms.

Of course, it is neither practical nor even possible to produce infinitely articulated images in finite time, so computer-generated, fractal-based forgeries of natural forms are never more than approximations to the true mathematical fractals. But because the same mathematical generating function, the same design principle, applies at each level, an approximation to a few levels works. It captures the essence of the pattern, and

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further depth merely enriches the image. The HyperTalk script at the end of this column asks how many levels deep to apply the algorithm. The more levels, the more compute time and the richer and more natural the image it produces.

The algorithm used in the script, adopted from *The Science of Fractal Images* by M.F. Barnsley, R.L. Devaney, B.B. Mandelbrot, H.O. Peitgen, D. Saupe, and R.F. Voss (Springer-Verlag, 1988), is particularly well suited to the mimicry of trees and shrubs. It is also very general. By specifying a short generating function and running it through a few levels of processing, you can conduct your own experiments in floral forgery.

The HyperTalk script consists of two components that carry out the two phases of the task. The first phase reduces the mathematical formulation of the fractal — the generating function — to a series of turtle-graphic commands: F for one step forward, + for a clockwise turn, and – for a counterclockwise turn. The second phase is a miniature turtle-graphic language interpreter that performs the graphic commands and draws the figure. This separation into phases means that you can rework the drawing algorithm without worrying about the more mathematical portion of the code. It also means that you can fine-tune graphics by dumping into a field the command string generated by the first phase, where you can edit it before submitting it to the drawing phase.

You should key in the script as a stack or card script and create the specified fields for data entry. I used fields rather than a dialog for input because I wanted to be able to build and draw from a library of fractals, but this presents a small practical problem. Since you don't want the fields cluttering up the screen when you produce the fractal image, you need to hide them when you aren't using them. There are several ways to do this; I used an invisible button (not described here) so that I could bring up the fields for examination on demand.

To use the script, you need to specify the generator function. This is somewhat complicated, so you should begin with the examples I have supplied. You specify the generator function in terms of turtle-graphic commands, supplying a starting value (such as F for forward) and one or more transformation rules, which tell the script how to generate the commands at level i from the commands at level i-1. The script then transforms the starting value according to the transformation rules to produce level 1, transforms the result to get level 2, and so on, for as many levels as you specify.

The transformation rules can be as complex as you wish, and you can have any number of them. You enter them into two fields: In and Out. At each level, the script will examine the string of turtle-graphic commands it is building, replace the expression in line 1 of field In with the expression in line 1 of field Out, wherever it occurs, and then replace line 2 with line 2 and so on. So each rule consists of two turtle-graphic command strings in two fields, and the transformation consists of replacing instances of the one string with the other, for example, replacing a line (command F) by a line with a zigzag (F–F+F+F–F).

Along with the script itself I have listed the commands recognized by the turtle-graphic interpreter, as well as several interesting generator functions to use and modify. Some of these generator functions employ symbols (X,Y) not in the vocabulary of the turtle-graphic interpreter; these are temporary value-holders representing an abstract relationship between levels; they ultimately get interpreted in terms of turtle-graphic commands, and the first phase of the script takes care to see that none of these intermediate symbols gets through to the turtle-graphic interpreter, which wouldn't know what to do with them. In creating your own generator functions, it is less confusing to stick with pure turtle-graphic commands initially.

The two other items you must specify are the number of directions you want your turtle to recognize and the number of levels you want to see. If all turns are to be 90-degree turns, there are four possible directions, and that's what you should specify. But if you will let your turtle make 30-degree turns, the number of directions is 12.

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CARD

Running the script, once the fields are loaded, consists of clicking somewhere on the card and telling how many levels you want to see. The number of levels you specify will strongly influence how long it takes to produce the graphic, so it is best to experiment with very small numbers (1 to 3) for this parameter, increasing only when you are willing to wait hours to see the result.

Yes, hours. Some of these functions take days to produce impressive images when running on a Mac II. They also use up memory: The chief memory demand is the turtle-graphic command string, which can grow to hundreds of thousands of characters.

I have used this script to generate interesting graphics on both a Macintosh II and an SE, but the most complex of these, when run out to level 12 or so, may outrun the memory capacity of either machine. You may want to explore improvements to the script to make it use memory less wastefully, such as by eliminating turtle-twitching command sequences like +– and –+.

In any case, I recommend that you try to estimate the memory demand before setting the script to a day-long computation. A safe benchmark for memory demand is to double the estimated command-string length; if it's not more characters than you have bytes of memory free, you should be all right.

You can estimate the length of the command string by observing or calculating the rate of growth of the string from level to level and extrapolating. If command-string length seems to be doubling with each new level and the command string is 2,000 characters long at level 9, it will likely be about 16,000 characters long at level 12, requiring no more than 32K.

```
Try these fractal image generators:

Name of fractal image: von Koch Snowflake Curve
Starting value (enter in field PAR line 1):
F
Transformation rule input (enter in field IN):
+
-
F
Transformation rule output (enter in field OUT):
+
-
F-F++F-F
Number of mouse directions (field PAR line 1):
6

Name of fractal image: Hilbert Curve
Starting value (enter in field PAR line 1):
X
Transformation rule input (enter in field IN):
+
-
F
X
Y
Transformation rule output (enter in field OUT):
+
-
F
```

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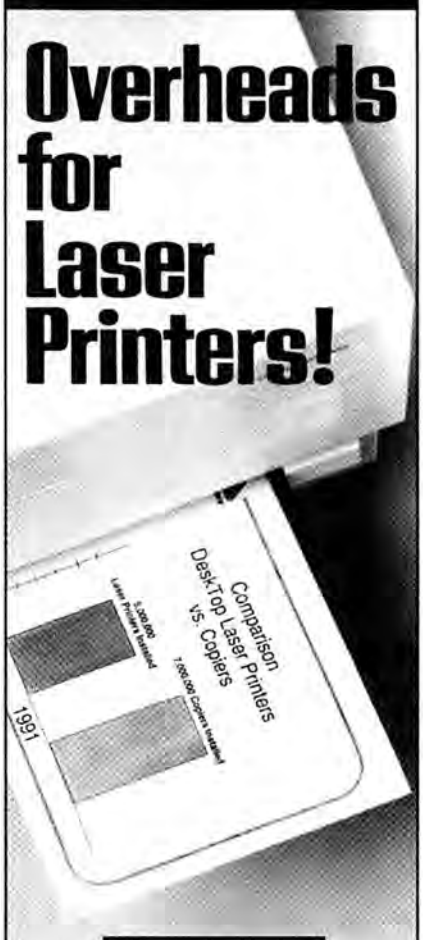
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```
-YF+XFX+FY-
+XF-YFY-FX+
Number of mouse directions (field PAR line 2):
4

Name of fractal image: Dragon Curve
Starting value (enter in field PAR line 1):
X
Transformation rule input (enter in field IN):
+
-
X
Y
Transformation rule output (enter in field OUT):
+
-
X+YF+
-FX-Y
Number of mouse directions (field PAR line 2):
4
```

```
-- A Fractal Generator Script
-- Released to the public domain
-- by Mike Swaine, December, 1988.
--
-- This is a card or stack script.
-- It is based on pseudocode by Dietmar Saupe
-- published in The Science of Fractal Images,
-- Peitgen & Saupe, eds, Springer-Verlag, 1988.

-- Turtle graphic commands recognized:
-- F Forward one unit
-- + Turn one unit clockwise
-- - Turn one unit counterclockwise

on mouseUp
-- Prompts for number of levels
-- and invokes the main handler.
  ask "MaxLevel?"
  if it is not empty
  then
    put it into maxLevel
    set brush to 28
    choose brush tool
   PlotOLSystem maxLevel
    choose browse tool
  end if
end mouseUp

on PlotOLSystem maxLevel
-- Main handler for fractal system.
 global str, xmin, xmax, ymin, ymax
 global tStackDir
  put 0 into xmin
```

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```
  put 0 into xmax
  put 0 into ymin
  put 0 into ymax
  put empty into tStackDir
  generateString maxLevel
  cleanUpString
  getCurveSize
  turtleInterpretation
end plotOLSystem

on generateString maxLevel
-- Generates turtle graphic command string,
-- iterating maxLevel levels deep.
-- Reads initial values from fields, along
-- with transformational rules that tell how
-- to turn the string at level i into the
-- string at level i+1.
  global axiom,kar
  global str,xmin,xmax,ymin,ymax
  put empty into str
  put line 1 of card field "par" into axiom
  put axiom into str0
  put empty into kar
  repeat with i=1 to the number of lines ¬
  of card field "in"
    get line i of card field "in"
    if it is not empty
    then put char 1 of it after kar
  end repeat
  put length(kar) into num
  put empty into rule
  repeat with i=1 to the number of lines ¬
  of card field "out"
    get line i of card field "out"
    if it is not empty
    then put it into item i of rule
  end repeat
  repeat with level=1 to maxLevel
    put empty into str
    repeat with k=1 to length(str0)
      put char k of str0 into command
      put level && command
      put 1 into i
      repeat while i<num and command is not ¬
      char i of kar
        add 1 to i
      end repeat
      if command=char i of kar
      then
        put item i of rule after str
      end if
    end repeat
    put str into str0
  end repeat
end generateString
```


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```
on cleanUpString
-- Eliminates nonterminal characters from a
-- string. These characters may legitimately
-- appear in turtle graphic command strings,
-- to be turned into terminal characters in
-- the next level of analysis.
  global str
  repeat with i=1 to length(str)
    put char i of str into c
     if c is in "F+-|[]" then put c after str0
  end repeat
  put str0 into str
end cleanUpString

on getCurveSize
-- Scales curve to fit screen.
  global str,command,co,si
  global turtleDir,turtleDirN,turtleX,turtleY
  global xmax,xmin,ymax,ymin
  -- Number of possible turtle directions:
  put line 2 of card field par into turtleDirN
  repeat with i=1 to turtleDirN
    put cos(2*pi*(i-1)/turtleDirN) into ¬
    item i of co
    put sin(2*pi*(i-1)/turtleDirN) into ¬
    item i of si
  end repeat
  put 0 into turtleDir
  put 0 into turtleX
  put 0 into turtleY
  repeat with i=1 to length(str)
    put char i of str into command
    upDateTurtleState command
    if command="F"
    then
      put max(turtleX,xmax) into xmax
      put min(turtleX,xmin) into xmin
      put max(turtleY,ymax) into ymax
      put min(turtleY,ymin) into ymin
    end if
  end repeat
end getCurveSize

on updateTurtleState command
-- Updates the state of the turtle.
  global co,si
  global turtleDir,turtleDirN,turtleX,turtleY
  global tStackDir
  if command="F"
  then
    add item turtleDir+1 of co to turtleX
    add item turtleDir+1 of si to turtleY
  else
    if command="+"
    then
      put (turtleDir + turtleDirN - 1) ¬
```

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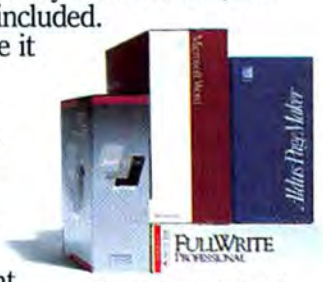
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MacUser gave WetPaint 5 mice (Sept. 1987) saying "...the WetPaint art is almost a must for clip-art users; the ArtRoundup desk accessory is a necessity." Volumes marked with * were previously released as part of the award winning "MacMemories" series.

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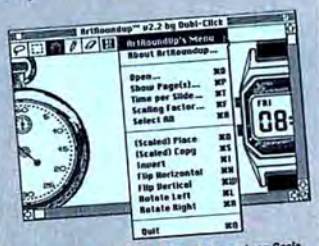
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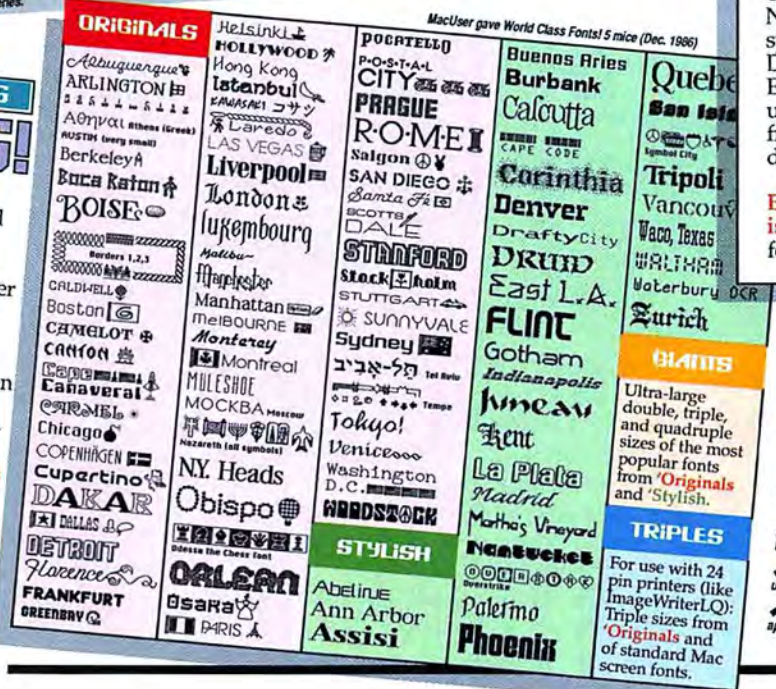
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```
        mod turtleDirN into turtleDir
      else
       if command="-"
       then
        put (turtleDir + 1) ¬
       mod turtleDirN into turtleDir
       else
       end if
      end if
    end if
end updateTurtleState

on turtleInterpretation
-- Interprets the state of the turtle,
-- drawing line segments for the turtle moves,
-- scaled to screen dimensions.
 global factor,xmax,xmin,ymax,ymin
 global str,command,si,co
 global xsize,ysize -- screen dimensions
 global turtleDir,turtleDirN,turtleX,turtleY
 put 512 into xsize
 put 342 into ysize
 put min((xsize-1)/(xmax-xmin),¬
 (ysize-1)/(ymax-ymin)) into factor
 put 0 into turtleDir
 put 0 into turtleX
 put 0 into turtleY
 put xScreen(turtleX) into x
 put yScreen(turtleY) into y
 repeat with i=1 to length(str)
   put x into oldX
   put y into oldY
   put char i of str into command
  updateTurtleState command
   put xScreen(turtleX) into x
   put yScreen(turtleY) into y
   if command="F"
   then
    drag from oldX,oldY to x,y
   end if
 end repeat
end turtleInterpretation

function xScreen turtleX
  -- Turns a turtle coordinate
  -- into a screen coordinate.
 global factor,xmin
 return round(factor*(turtleX - xmin))
end xScreen

function yScreen turtleY
  -- Turns a turtle coordinate
  -- into a screen coordinate.
 global factor,ymin
 return round(factor*(turtleY - ymin))
end yScreen
```

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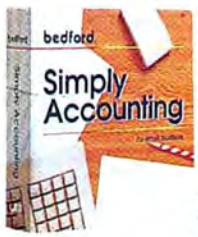
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THE HELP FOLDER

BY CHRIS ESPINOSA

Got a Mac problem? Something you'd like explained? Something you can't find the answer for anywhere else? Apple's Chris Espinosa will answer your questions every month in this space. When the questions are too tough or too esoteric for him, he'll get the answers from other members of the Mac team. So ask what you need to know and get your answers straight from the source!

Send your questions to Chris, c/o MacUser, *950 Tower Lane, 18th floor, Foster City, CA 94404. Chris will read all your questions, but, unfortunately, he may not be able to answer individual queries.*

IN THE MAILBAG

Bunches of people turned me on to two utilities to change the icons for disk drives. I got a copy of FaceLift, written by Greg Marriott and Scott T. Boyd at Apple, based on a program by Ron Aldrich. To use it, you drop it in your System folder, use ResEdit to add or edit icons (in the ICN# resource), and give each icon the name of a hard disk drive. Then save and close ResEdit and restart. Whenever a hard-disk drive (or server or CD-ROM) comes up on the desktop, FaceLift sneaks in, checks its name, and substitutes the icon you had given that name. It's elegant and fast; I've also been told of another INIT called Facade that does much the same thing. Thanks to half a dozen people for bringing this to my attention. You can get both INITs in most of the standard shareware places (user groups and bulletin boards); Robert Taub sends in a plug for his own board, which you can call at (516) 499-8471 to download FaceLift.

NO NAME FONT

Q. I recently installed System 6.0 on my Mac and was reviewing the fonts with Font/DA Mover when I found two fonts named "No Name 9." The first was very similar to Monaco, and the second was the same but in italic. I had not installed either font on my Mac, so I attempted to remove them. As soon as I clicked on the Remove button, I got a message that said, "Sorry, a serious error has occurred." I had no recourse but to attempt restarting the System with the on/off switch.

On doing so, I found that the System would not boot. I got only an icon of a floppy disk with a question mark (where's the System?) To restore my Mac to working order, I had to initialize the internal hard disk and reinstall everything. I replaced System 6.0 with the older 4.2 and have had no problems since.

Any idea where No Name came from or why it destroyed my system when I tried to remove it?

J. A. WILLIAMSON
HOCKESSIN, DEL.

A. Font/DA Mover shows "No Name" when a font is present that doesn't have a name. Most do. Only special hidden fonts (like that for HyperCard's Tools palette) don't have names, because they're not for general use. But there are no such fonts in System 6.0, so the font you saw was probably a corrupted version of Monaco that had been damaged during the installation.

If it was a damaged font, I'm not surprised that Font/DA Mover blew up; most programs would. But Font/DA Mover is special in that it lets you change the System file as well as access it, and your System crashed in the middle of removing something from the System file — whose "parts are all over the floor" at that fairly delicate moment. So I'm also not surprised your System wouldn't reboot after the crash.

But you shouldn't have had to reformat your hard-disk drive. Whenever your Mac won't boot, take it one step at a time. First, start up from the most recent System Tools floppy disk. If your hard disk shows up on the desktop, then the hard-disk drive is fine and doesn't need reformatting. Try running an application from the hard disk. If you can then eject the floppy, and the Mac doesn't ask for it back, then even your System file is fine; you just need to replace the Finder.

It's probably a good idea to check out System 6.0.2 at some point. But if you're having no problems with 4.2, you have no reason to change.

HOW MANY MEGABYTES?

Q. I want to upgrade the RAM in my Macintosh SE, which is now 1 megabyte, to either 2 megabytes or 4 megabytes. I am confused when I hear that the 2-megabyte upgrade is really a 2.5-megabyte upgrade. Does this mean that the 4-megabyte upgrade is really a 4.5-megabyte upgrade?

I am not an electronics technician, but I am a professional engineer, and I'm good with my hands. Could I do this job myself without ruining the computer? Where can I buy a book on the subject and get proper instructions and tools? I've been told that precautions against static electricity must be taken. How?

RICHARD G. HAWN
ERIE, PA.

THE HELP FOLDER

A. Inside the Macintosh SE are four connectors for single in-line memory modules (SIMMS). A SIMM holds eight memory chips and snaps into one of the connectors. There are two kinds of SIMMs: 256K SIMMs (a quarter of a megabyte) and 1-megabyte SIMMs.

Your SE requires matched pairs of SIMMs, so here are your choices with four slots: one pair of 256K, two pairs of 256K, one pair of each kind, or two pairs of 1 megabyte. Multiplying it out, you can see that these four configurations give you 512K, 1 megabyte, 2.5 megabytes, or 4 megabytes, respectively.

Your Mac has the 1-megabyte configuration — two pairs of 256K SIMMs. To upgrade, you can buy one or two pairs of 1-megabyte parts. But you have to remove one pair of 256K parts for each pair of 1-megabyte parts you install, because there are only four connectors.

So, if you buy the 2-megabyte upgrade package (one pair of 2-megabyte SIMMs), you remove 512K worth of memory from your 1-megabyte Mac and add 2 megabytes, giving you a total of 2.5 megabytes. If you buy the 4-megabyte upgrade (two pairs), you remove both pairs of 1-megabyte parts and replace them, leaving you with 4 megabytes.

Either way, you'll have some 256K parts left over. Some people use those to upgrade a 1-megabyte Macintosh II to 2 megabytes, because the Macintosh II has eight SIMM connectors internally.

Removing and installing SIMMs is not difficult, but opening up a Mac SE is. You need a special Torx screwdriver, and it helps to have a "spreader" tool to open up the case. You have to take special precautions to discharge the excess voltage on the cathode-ray tube so you don't damage internal components (either the Mac's or your own!). And you should use grounded wrist straps and static-reducing floor and table mats in your work area when you're dealing with SIMMs.

Sams Books has a service guide to the Mac, which lists the tools necessary to do basic cleaning and maintenance.

ANOTHER DVORAK FAN

Q. Among the many programs that can change the keyboard from QWERTY to Dvorak and back, do you know of any that would be a cdev? I'd like my Mac to boot up in Dvorak and be able to choose the keyboard layout from the Control

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Panel. Also, moving the keys to different locations has proven less than satisfactory because the keys on different rows have different shapes. Do you know of any labels one could use instead (preferably coffee and sweat resistant)?

DENIS CHABOT
CALGARY, ALBERTA

A. I looked around for Dvorak keyboard layouts and found only two kinds: those that let you determine the layout automatically at boot but force you to reboot to change, and those that let you change at any time but can't set up automatically at boot. (The latter is MacQwerty, from Paragon Concepts, 4954 Sun Valley Road, Del Mar, CA 92014; (619) 481-1477.)

The tops of the keys are the part of the computer that's subject to the most hostile environment: repeated pounding by sweaty fingers. Apple's key labels are imprinted by a process called thermal sublimation, in which the "ink" is chemically bonded to the plastic so it won't rub off or smear. (We tested several processes, one of which held up to almost everything — except Oil of Olay!). I'd try writing on the *underside* of little squares of acetate with a permanent marker, then using epoxy to attach them securely to the key caps. Test it first to ensure that the glue doesn't smear the marker ink.

WASTING PAPER

Q. **I have a Mac 512KE used with an ImageWriter II and Microsoft Works. The problem I encounter quite often is that when I print multiple copies of a document, after the copies are printed, the printer feeds the same number of blank pieces of paper through the sheet feeder. As a result, I am constantly replacing blank paper in my sheet feeder.**

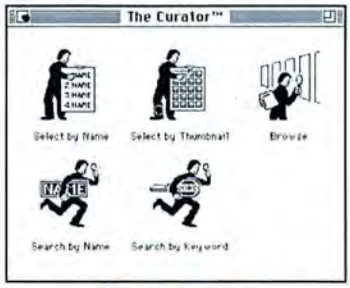
How can I tell the printer to print only the required number of pages without the same number of blanks coming through? I even sometimes encounter this problem when printing only one copy of a document.

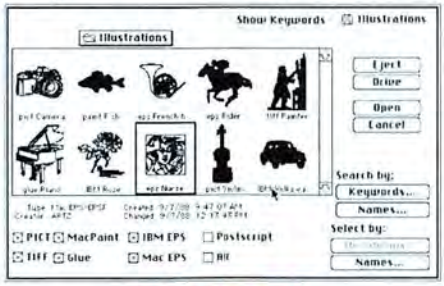
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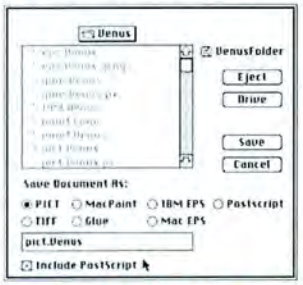
A. The printer is fine, but Microsoft Works thinks you're working on a two-page document. It's printing all the page 1s, then all the page 2s. (It does this because you only have 512K of memory; if you had 1 megabyte, you'd see alternating printed and blank pages. In low-memory situations, some programs "spool" a temporary image of each page to disk before printing, be-

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THE HELP FOLDER

cause there's not enough RAM to store the image.)

The most common reason for Works to think your document is longer than you do is that you have extra Return characters at the end. Open the document and drag the scroll bar all the way to the bottom. Is the screen blank? You're looking at the blank page 2, the one the sheet feeder just fed through. Click in the blank space and press Backspace. Keep backspacing until you see the last line of your text appear, then backspace right up to that. That should eliminate the extra Return characters and reduce your document to its one-page length.

EASY ACCESS

Q. In the sidebar on page 146 in the November '88 issue of *MacUser*, Jane Berliss mentions "Easy Access" but not how to obtain it. I have a tremor in both hands as a result of a stroke several years ago, and so I use a Dvorak layout that I find much better than the standard QWERTY. But with the tremor I need all the extra help I can get, so I'd really appreciate knowing more about "Easy Access."
HAROLD F. CHEVALIER
BETHESDA, MD.

A. Easy Access is a set of utilities built into the Macintosh system software that allows the user to modify the operation of the keyboard and mouse (See "Open Door Policy," February '88.)

Sticky Keys is a feature that allows single-finger operation of the keyboard. With Sticky Keys turned on, the "modifier" keys (such as Shift) can be pressed before the key they modify, rather than at the same time. Pressing the modifier key once modifies the next keystroke only; pressing it twice locks it on until it is turned off by being pressed again. Multiple-modifier key sequences (like Shift-Option) can be executed using Sticky Keys. An indicator in the menu bar shows you which modifier key is active.

MouseKeys is a feature that allows the keys on the numeric keypad to be used in place of the mouse.

Easy Access is included in the Macintosh system software update for all versions of the Mac system software since version 4.1.

LANDSCAPE DESIGN WITH A MAC

Q. I wish to obtain information on software suitable for use in horticultural landscape planning. Some kind of CAD software might be ideal for this purpose. I would be using whatever I purchase in my Macintosh

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Whatever you do on your Macintosh, you'll do it more productively with a T16.

SE, which has 2 megabytes of internal memory and an external 40-megabyte hard disk. I also have a full-page display and a laser printer.
MICHAEL W. L. PEASE
ALGARVE, PORTUGAL

A. Since you mention CAD (computer-aided design), I assume you mean professional-level landscape design, not just puttering in your garden. (If you want to just putter, there are plenty of clip-art packages with trees, shrubs, and so on, that you can use with any Mac drawing or painting program.) MGMStation is a professional-level, two-dimensional CAD design and drafting package that lets you draw lines, arcs, circles, fillets, intersections, splines (smooth curves), and shapes, and lets you move, rotate, mirror, dimension, and delete elements of the drawing. It gives you multiple drawing layers that you can show individually or simultaneously — for example, just the trees, or trees and flowers, or both on the background of the brick paths.

It's made for use with a set of predesigned symbols and elements, and several are available: the Architecture package ($195) has some landscape symbols, though you might want to design your own and add them to the library.

MGMStation is pricey; its suggested retail price is $999 (black-and-white version). Contact Micro CAD/CAM, Inc., 5900 Sepulveda Blvd. Van Nuys, CA 91411; (818) 376-0008.

BLINDED BY SCIENCE

Q. Where can I find a reference for hard-core science applications such as hydrogeologic modeling?
DAVID ORR
COLUMBUS, OHIO

A. The best place is the Kinko's Academic Courseware Exchange, which is a low-price software market operated by the Kinko's Copy centers that are a fixture on many American college campuses. The catalog has liberal arts, education, science, computer science, and math applications written by professors and students. Some of the science applications include General Chemistry, GeoStructures, Huckel Molecular Orbitals, Rate Law and the reaction rates of chemical reactions, physics simulations including electromagnetism, and a Model Neuron.

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report, here's a condensed version.

As with other E-Machines models, the T19 screen image is very sharp and has excellent color quality and gray purity. Image quality is comparable to the T16, and for those who want a larger screen, the T19 is the way to go. E-Machines has once again produced a winner in the color monitor market.

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THE HELP FOLDER

8000, or you can call the Academic Courseware Exchange office (7 AM to 5 PM Pacific Standard Time) at (800) 235-6919; in California, (800) 292-6640. Outside the United States, you can call the A.C.E. at (805) 652-4158.

KEEPING TRACK OF HORSES

Q. I am looking for a program for recording and researching pedigrees of race horses (American or foreign thoroughbreds).

Would it be possible for you to guide me in the right direction?

AUDREY GONZALES
MONTEVIDEO, URUGUAY

A. Check out MacHorse from Dapple Computers, P.O. Box 220, Laurel, MD 20707; (301)792-2735. It might be more than you want: It's a complete horse farm-management system for veterinarians, breeders, trainers, and show horse operators that does partnership, syndication, billing, history recall, and health records, as well as detailed racing, training, and breeding records. It also lets you dial up Bloodstock Research, Stallion Access, MatchMaker, and other information services over a modem. All for only $2,500.

If you need something simpler, you might want to consider using HyperCard to keep track of your information by linking together the cards of related horses.

BAD FLOPPIES

Q. I've had an enormous number of floppy disk errors — more than 20 bad Sony disks this year alone. I didn't have these problems with my original Mac (only a few bad disks over several years), but when I switched to the SE, bad disks started coming out of the woodwork. Most of the time, a disk will work great until one day — out of the blue — I'll put it into my Mac, which will ask if I want to reinitialize it. At that point I click No and try to check it over with MacTools. Sometimes the disk will seem OK until a Verify Disk is performed (revealing numerous errors). Other times I get the dialog box asking whether I want to mount, erase, view, or eject the disk. Even if I get it mounted, it still shows errors when verified.

I've had my computer and drives checked, and they all passed. Could the problem be dust or interference from magnetic fields? When they're not in use, I keep the disks in cases, out of the sunlight, and away from obvious threats (magnets, cathode-ray tubes, speakers, and so on.) Do you have any ideas why the disks suddenly bomb

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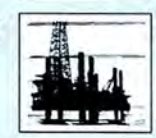
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and how it might be prevented?

JEFFRY WINDSOR
OAK RIDGE, LA.

A. First, I assume that when you switched to the SE, you switched to double-sided disks for the SE's 800K double-sided disk drive. (Single-sided disks may seem to work fine when formatted double-sided — but they tend to lose their information after a few uses.)

It sounds like you kept your disks safe from most of the magnetic disk devils, but when the disk's performance is sporadic, that tends to indicate that the damage is physical, not magnetic. The oxide coating that's on the plastic disk can bend and flake off, resulting in "dropouts," just like on audio- or videotape. The difference is that on audio tape, dropouts sound like pops, and on videotape, they look like "snow." On floppy disks, though, they can result in an entire disk becoming inaccessible.

Dropouts can happen in droves if you buy a bad batch of disks. Check the manufacturing code on the back side of the disk, usually right above the molded "Made In Japan." If all the bad disks have the same manufacturing code, then it was probably a bad batch, and you may be able to get your money back (but not your data) if they were under warranty. Or it could be that you're just using the disks a lot. When the Mac says a disk is unreadable, it means that the directory is damaged; since the directory is the most-used piece of information on the disk, you could simply have worn out the directory track. But that's not supposed to happen for thousands of hours of total use.

The checks your dealer ran only test the electrical performance of the drive. You're right in suspecting dust: If something got onto the disk head, it might be acting as an abrasive and scratching away the oxide from your floppies, causing them to wear out prematurely, and the electrical tests can't uncover that. In that case, get a floppy-disk drive head-cleaning kit and clean up your drive heads. Drive safely.

WITHER LISA?

Q. I recently saw an ad for the Apple Lisa by a company that claims to have been authorized by Apple to sell the out-of-production Lisa. The company says that its Lisas will run "most" Macintosh software. Is this possible? Can I run current versions of Microsoft Word, Cricket Graph, or any major software?

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THE HELP FOLDER

As a college student with large computing needs, yet without a large budget, this is a difficult offer to refuse — but only if the Lisa does deliver nearly 100 percent of compatibility with the Mac Plus. Please set the record straight on this important discovery. Although nothing is as promising as it first appears, perhaps just this once I can be spared a great expense without sacrificing my computing needs.

TODD HECHTMAN
HIGHLAND PARK, ILL.

A. The Lisa was originally designed to run its own set of applications. With the introduction of the Macintosh, however, Apple also introduced MacWorks, which was software that enabled the Lisa to emulate a Macintosh. Later, the Lisa was renamed the Macintosh XL (for "Ex-Lisa" or "Extra-Large") and the Lisa software was deemphasized; later, it was dropped altogether.

But a lot of Lisas were shipped, and many original Lisa owners have traded them in on Macintoshes. A company called Sun System Remarketing refurbishes these Lisas and adds a newer version of the MacWorks software, called MacWorks Plus, that supports MultiFinder and multiple hard disks.

Before the Macintosh II was introduced, I was using a Mac XL with its built-in hard disk and 2 megabytes of AST RAM, and running Switcher on the Lisa's bigger screen — and printing over AppleTalk as well! So I had much of what my coworkers waited for the Macintosh II to get. The only problem is that although the Lisa uses the same 68000 microprocessor that the Macintosh Plus does, it clocks it at 5 megahertz instead of 8 megahertz, so software runs a little slower than on the Plus (and a good deal slower than on the II).

I don't have a complete compatibility list for MacWorks Plus, but as with any question of compatibility, I wouldn't take anybody's word for it — you have to try it. Write to Sun Remarketing, P.O. Box 4059, Logan, UT 84321; (800) 821-3221 and find out where a local dealer is. Then try your key software on a Lisa running MacWorks.

Yes, you can save money by using a discontinued computer. But even if your software runs on it now, at some point the software vendors might revise the software, and you might find that it won't run on the Lisa anymore. So remember that the money you save now is money you'll probably spend on a mainstream Mac later.

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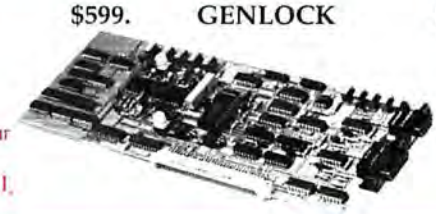
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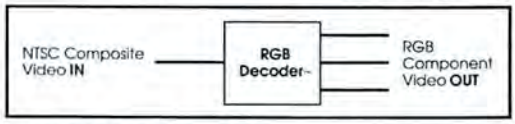
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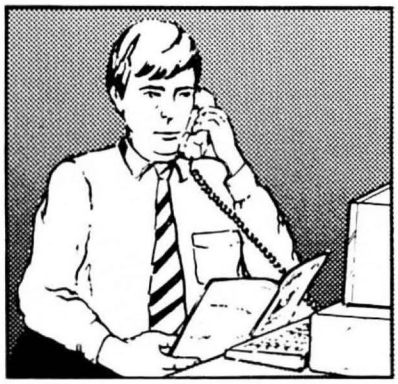
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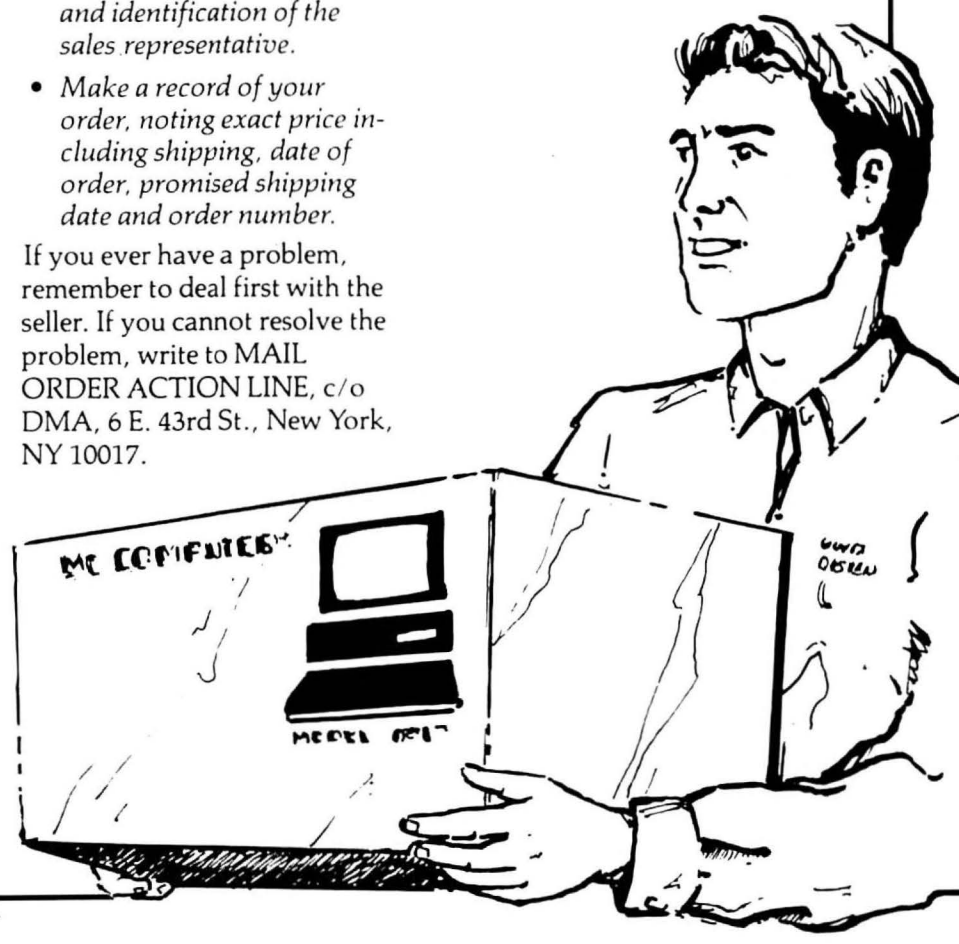
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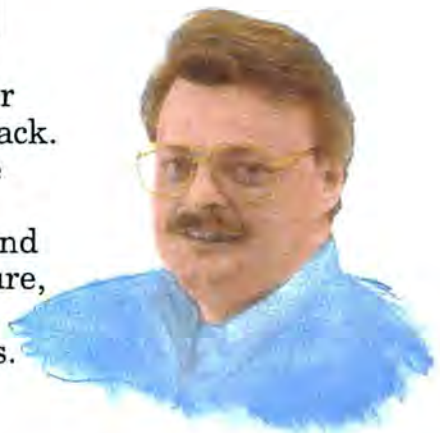
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UPDATES

In the evolutionary unity of the Mac, change is always apparent. Programs are constantly being reanimated with upgrades and new versions. For many, keeping up with these transformations isn't easy.

The following chart is an attempt at keeping the interest and knowledge of Mac users up-to-date with upgrades and new versions (as of press time) of many popular programs. To see if you have the most current versions, check the About . . . item at the top of the Apple menu when you run a program.

Those with the 512K, 512KE, or XL should be running System 3.2 and Finder 5.3. Everyone else should be running System 6.0.2.

Microsoft has updated Works 2.0, which includes new drawing tools, macros, and integrated spelling checker, and a larger spreadsheet. Works 2.0 also includes HyperCard computer-based training.

All programs listed here are HFS compatible. From this chart, you can extract the following information: CP or NCP, copy protected or not;//, programs we have found to be Mac II compatible (not yet a comprehensive list); and S for shareware (try before you buy).

Changes and new listings are in **bold.** Programs that appear to be compatible with the Macintosh II may not actually perform 100 percent of the functions they do on other Macintoshes, nor do they necessarily take full advantage of the Mac II.

A.A.I.S. Prolog	M1.15	NCP
Accountant, Inc.	2.1	NCP,//
Acta	2.0	NCP,//
AffiniFile	1.1	NCP,//
AMS General Ledger	2.08	NCP
AppleShare Workstation	2.0.1	NCP,//
ArtRoom	3.0	NCP,//
Aztec C	3.4b	NCP,//
Backgrounder	1.2	NCP
Back to Basics	1.03	NCP
Bulk Mailer	3.0	NCP,//
Business Filevision	1.1	NCP
CalendarMaker	3.0	NCP,//
Canvas	2	NCP,//
Capture	1.1	NCP,//
CAT	2	NCP, //
Chart	1.02	NCP
Chooser	3.3	NCP
ClickArt Effects	1.01	NCP,//
Clipper	1.01	NCP
CloseView	1.0	NCP
Cognate	1.5	NCP,//
ColorChart	1.3	NCP
Colorizer	1.1	NCP,//
ColorMate	2.1	NCP
ColorPrint	2.03	NCP
Comic Strip Factory	1.6	NCP,//
Comic Works	1.0	NCP,//
Comment	2.0	NCP,//
ConcertWare+	4.0	NCP,//
ConcertWare+MIDI	4.0	NCP,//
Control Panel	3.3	NCP
Copy II HD	7.1	NCP
Copy II Mac	7.1	NCP
Cricket Draw	1.1.1	NCP,//
Cricket Graph	1.2	NCP
Cricket Presents	2.0	NCP,//
Curator	1.04	NCP,//
DA Handler	6.0	NCP
Deluxe Music Construction Set	2.0	CP
Design/IDEF	1.1	NCP,//
DesignScope	1.14	NCP,//
DeskLink	2.0	NCP,//
Disk Express	1.10	NCP
Disk First Aid	1.4	NCP
DiskFit	1.4	NCP,//
DiskInfo	1.45	NCP,S
Disk Ranger	3.1	NCP
Disk Tools Plus	1.01	NCP,//
DiskTop	3.03	NCP,//
Dollars & Sense	4.0	NCP,//
Double Helix II	r40	NCP,//
"Draw it Again, Sam"	2.04	NCP,//
Dungeon Revealed	1.2.3	NCP,//
Easy Access	1.0	NCP
Easy3D	1.01	NCP
Edit	2.1	NCP
Excel	1.5	NCP,//
ExperCommon Lisp	2.2	NCP
ExperLisp	1.5	NCP,//
ExperLogo	1.1	NCP
Expressionist	2.0.3	NCP,//
EZ Draft	2.0	NCP,//
Falcon	2	NCP,//
FastBack	1.02	NCP,//
Fast Forms	1.2	NCP,//
File	2.0	NCP,//
Ferrari Grand Prix	1.5	CP,//
Filemaker II	1	NCP,//
Finder (HFS)	6.1	NCP
Finder (MFS-128K)	4.1	NCP
Findswell	2.0	NCP,//
1st Aid Kit-HFS	2.5	NCP,//
FONTastic Plus	2	NCP,//
FontFolio	1.0	CP,//
Font/DA Mover	3.8	NCP
Fontographer	2.3	CP
FontShare	1.1	NCP,//
Forecast	2.0	NCP,//
4th Dimension	1.0.6	NCP,//
FoxBASE+/Mac	1.10	NCP,//
Frame Mac	1.1	NCP,//
FreeHand	2.0	NCP,//
FreeTerm	2.0	NCP,//
FullPaint	1.0	NCP
FullWrite Professional	1.0	NCP,//
General	3.3	NCP
GeoQuery	1.01	NCP,//
Glue	1.04	NCP
GraphicWorks	1.13	NCP
Handwriting Analyst	1.2	NCP,//
Hard Disk 20	1.1	NCP
Hard Disk Utility	2.0	NCP
HD Backup	1.1	NCP
HD SC Setup Apple	2.0	NCP
HFS Backup	3.0	NCP,//
HFS Locator Plus	2.0	NCP
HyperCard	1.2.1	NCP,//
HyperDA	1.1	NCP,//
HyperEngine	1.1	//
Illustrator	1.0	CP/NCP,//
ImageWriter	2.7	NCP
ImageWriter, AppleTalk	2.7	NCP
ImageWriter LQ	2	NCP,//
ImageWriter LQ, AppleTalk	2	NCP,//
InBox	3.0	NCP,//
Insight Expert Accounting	2.01	NCP,//
Installer	2.04	CP,//
inTalk	3.0	NCP,//
Interleaf Publisher	3.5	CP,//
Jam Session	1.1	CP,//
Jazz	1A	CP
JustText	1.1	NCP
Keyboard	3.3	NCP
Key Layout	2.3	NCP,//
Language Systems FORTRAN	1.2	NCP,//
LapLink Mac	2.0	NCP,//
Laser Author	1.3	NCP,//
LaserPaint	1.9	NCP,//
Laser Prep	5.2	NCP
LaserShare	1.0	NCP
LaserSpeed	1.6	NCP,//
LaserStatus	2.0	NCP
LaserWriter	5.2	NCP
LaserWriter IISC	1.1	NCP
Layout	1.3	NCP,S
Legal Billing	1.72	NCP,//
Legal Billing II	2.39	NCP,//
LightSpeedC	3.0	NCP,//
LightSpeed Pascal	2.0	NCP,//
Listen 2.0	2.1	CP,//
Lookup	1.0c	NCP,//
Mac3D	2.1	NCP,//
MacASM	1.2	NCP
MacBillboard	4.01	NCP,S
Mac C	5.0	NCP,//
MacCalc	1.2	NCP
MacChuck	1.5	NCP,//
Mac Daisy Link	1.04	NCP,//
Mac Disk Catalog II	2.1c	NCP
MacDraw II	1.0	NCP,//
MacDraft	1.2b	NCP,//
MacFlow	2.04	NCP,//
MacFortran (all)	2.4	NCP,//
MacFortran / A/UX	1.0	NCP,//
MacGolf Classic	3.0	CP,//
MacInTalk	1.1	NCP
MacLabeler	2.2	CP
MacMoney	3.02	NCP,//
MacMovies	1.02	NCP
MacNosy V2	2.8	NCP
MacPaint	2.0	NCP,//
MacPalette	1.0	CP
MacPascal	2.1	CP
MacProject II	1.0	NCP,//
MacProof	3.0	NCP
MacSchedule	1.1	CP,/.
MacScheme+ Toolsmith	1.51	NCP,//
MacServe	2.3	CP,//
MacSpec	1.3	CP
MacSpin	1.1	CP
MacSpool	3.0	NCP,//
MacTerminal	2.3	NCP,//
MacTools (MFS/HFS)	7.1	NCP
MacWrite	5.0	NCP,//
Mac Zap	5.0	NCP,//
MailManager	1.0	CP
Managing Your Money	2.0	NCP,//
Map	1.1	NCP
MapMaker	3.0	NCP,//
Mavis Beacon Teaches Typing!	1.2	NCP,//
MDA	2.0	NCP,//
MDS	2.0	NCP
Measure Test	12.7	CP,S,//
Megamax C	3.0	NCP
MGMStation CAD	2.5	NCP,//
MicroPhone II	2	NCP,//
Micro Planner Plus	6.0	NCP,//
MindWrite	2.0	NCP,//
MockPackage+	4.3.4	NCP,S
Modern Artist	2.0	NCP,//
MORE	II	NCP,//
Mouse	3.3	NCP
MPW	3.0B1	NCP,//
MS BASIC	3.0	NCP
MS BASIC Compiler	1.0	NCP
MS Fortran	2.2	NCP
MS Works	1.1	NCP,//
MultiFinder	6.0	NCP,//
Multiplan	1.11	NCP,//
Music Publisher	2.0	NCP,//
MusicWorks	1.1	CP
myDiskLabeler	2.11	NCP,//
'Ncryptor	2.0	NCP,//
Neon	2.0	NCP
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PowerPoint	2.0	NCP,//
PowerStation	2.5	NCP,//
Print Monitor	1.2	NCP,//
Professional Composer	2.1	CP
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Project Billing	3.0	NCP,//
Pyro!	3	NCP,//
QuarkStyle	1.0	NCP,//
QuarkXPress	2.0	NCP,//
QUED/M	2.07	NCP,//
QuicKeys	1.1	NCP,//
QuickMail	1.0.5	NCP,//
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Ragtime	2.01	NCP,//
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SCSI Tool	1.1	NCP,//
Sensible Grammar	1.1d	NCP,//
SideKick	2.0	NCP
Silicon Press	1.1	NCP
Slide Show Magician	1.3	CP
Smartcom II	3.0a	NCP,//
SmartScrap & The Clipper	1.03	NCP,//
Sound	3.3	NCP,//
SoundCap	4.4	CP
Space Edit	2.0	CP,//
SpellNow	1.0	NCP
Spellswell	2.0f	NCP,//
Startup Device	3.3	NCP,//
StatView 512+	1.1	NCP
StatWorks	1.2	NCP,//
Stella	1.3	CP,//
Stepping Out II	2.01	NCP,//
Straight Talk	2.08	NCP,//
Studio Session	1.4	CP
Suitcase	1.2.1	NCP,//
Suitcase II	1.2	NCP,//
SUM (Symantec Utilities for the Mac)	1.1	NCP,//
SuperGlue	1.03	NCP,//
SuperPaint	1.00	NCP,//
Systat	3.2	NCP
System (HFS)	6.0.2	NCP,//
System (MFS-128K)	2.0	NCP
Telescape	1.0	NCP,//
Telescape Pro VT 100	1.1	NCP
Tempo II	1.1	NCP,//
Tetris	1.1	NCP,//
Textures	1.01	NCP,//
Think 'n Time	2.0	NCP,//
Thunder!	1.0.1	NCP
Thunderscan	4.0	NCP
TML Pascal II	1.00	NCP,//
TMON	2.8	NCP
Top Desk	3.0	CP
TOPS	2.0	NCP,//
Trapeze	2.1	NCP,//
Turbo Download	2.1	NCP,//
Turbo Maccountant	2.0	NCP,//
Turbo Pascal	1.1	NCP,//
Type Now	1.0	NCP,//
VersaCAD	2	NCP,//
VersaTerm	3.0	NCP
VersaTerm Pro	2.0	NCP
VideoWorks II	2.0	NCP,//
VIP	2.5	NCP,//
Widgets	3.0	NCP
Word	4.0	NCP,//
WordPerfect	1.0.1	NCP,//
Works	2.0	NCP,//
Write	1.0	NCP,//
WriteNow	1.07	NCP,//
ZBasic	4.0	NCP

MINIFINDERS



Have you often wished for a personal assistant to help in picking software? These MiniFinders may not breathe and move, but they do tell you what products are hot and, better, what these products do. Each of these items has been carefully reviewed and selected by the *MacUser* editorial staff. Each has been rated in increments of half mice, from 1 to 5. Ratings are relative within categories, and they can change as categories expand and new products advance the state of the art. You won't see many low ratings or bombs, since we're telling you about the cream of the crop, but we will warn you about the really bad products so that you don't spend your money on them. Red names indicate this month's additions. The letters at the end of the entries indicate whether a product is copy protected (CP) or not (NCP). If a product has been reviewed or Quick Clicked in *MacUser*, the date of the review is shown. Eddy (Editor's Choice) Award winners are noted with a ★ and the year in which they won prizes for an excellent product. Next time you have to find products you can count on, count on *MacUser*!

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BUSINESS ACCOUNTING

Accountant, Inc. integrates accounts payable, accounts receivable, general ledger, and inventory modules. Prints checks, purchase orders, invoices, customized reports. Bare-bones accounting system limited in size and scope, but ease of use and integration make it suitable for small businesses. Requires 512K+. Version 2.0. $299. SoftSync, 162 Madison Ave., New York, NY 10016. NCP (Oct '87)
★★★

Back to Basics Accounting is a powerful double-entry accounting software package for the small business user with GL, AR, and AP modules. Exhaustive manual with numerous examples. Report capabilities are excellent. $199. Peachtree, 4355 Shackleford Road, Norcross, GA 30093. NCP (May '87)
★★★★

BPI General Accounting is an easy-to-use system. Six journals, AR, AP, Payroll, and GL on one disk. Offset amounts automatically post to ledgers. Up to 8000 accounts. Detailed records, wide range of reports. Requires 512K+. $249. BPI Systems, 3001 Bee Cave Road, Austin, TX 78746. NCP (Aug '86)
★★★★

Insight is a high-powered accounting program for the small-to-medium-sized business. Modules include Accounts Receivable, Payables, and General Ledger; others are in the works. Requires 512K and hard disk. $595. Layered, 529 Main St., Boston, MA 02129. NCP (Dec '86) ★'86 Eddy
★★★★½

Rags to Riches integrated accounting modules (General Ledger and Accounts Receivable) uses Mac interface to the hilt. Information entered in one window automatically transfers. Detailed, flexible report options. Very easy to use, but it can be confusing with several windows on-screen. Requires 512K+ and printer. $199.95 per module. Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Dec '85)
★★★★½

Rags to Riches Professional Billing tracks and bills professional services. Batches activities for individual timekeepers. Use as stand-alone, or integrate with R to R modules. Requires 512K+, printer. $399.95. Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Feb '87)
★★★★

Simply Accounting has six ledgers and eight journals to handle the needs of most small-to-medium sized businesses. Better Mac interface than most. Payroll tax labels can't be modified, which forces you to subscribe to Bedford's yearly update service. Version 1.03. Requires 1 megabyte. $349. Bedford Software, 15311 N.E. 90th St., Redmond, WA 98052. NCP (Sept '88)
★★★★

Strictly Business General Ledger features clear, well-outlined setup procedures and operations. Very flexible, up to 99 profit centers with up to 100 departments each, and customized reports. Program print spools. Requires 512K+, printer and external drive. $395. Future Design, 13681 Williamette Drive, Westminster, CA 92683. NCP (Dec '85) ★'85 Eddy
★★★★

Timeslips III tracks billing and expense information for people who charge by the hour. DA turns the clock on and automatically bills a client when a session is over. Version 1.06. Requires 512K and two disk drives. Mac II and MultiFinder friendly. $199.95. North Edge Software, 239 Western Ave., Essex, MA 01929. NCP (Sept '88)
★★★★½

PERSONAL FINANCE

Dollars & Sense is a bookkeeping program. Easy to use, with a good manual and excellent on-screen help. Will handle up to 120 separate accounts or money categories. Uses standard double-entry accounting techniques. Will work on 128K. $149.95. Monogram, 8295 S. La Cienega Blvd., Inglewood, CA 90301. CP (Mar '87)
★★★

MacInTax is an excellent tool for preparing tax forms. Intuitive, easy-to-use. Accepts data from leading personal finance programs. Good built-in help. Liberal upgrade policy for current owners. California forms set also available. $119 federal; $65 California. SoftView, 4820 Adohr Lane, Suite F, Camarillo, CA 93010. NCP (Mar '87) ★'86 Eddy
★★★★★

MacMoney is a financial manager that uses information gleaned from your checks and deposit slips. Produces a variety of reports and graphs. Version 3.1 reviewed. Requires 512KE and printer. $119.95. Survivor Software, 11222 La Cienega Blvd., Inglewood, CA 90304. NCP (July '88) ★'86 Eddy
★★★★

Quicken helps you write checks, then keeps a ledger showing you where all of your money goes. Tax information is automatically generated. Version 1.0. Requires 512K and printer. $49.95. Intuit, 540 University Ave., Palo Alto, CA 94301. NCP (Nov '88)
★★★★★

Wall Street Investor spots stock market trends. Downloads information from an electronic service. Good charting ability. Previously known as Market Pro. Version 2.1. Requires 1 megabyte, two 800K drives or hard disk, Hayes-compatible modem, and an I.P. Sharp account. $495. Pro Plus Software, 2150 East Brown Road, Mesa, AZ 85203. NCP (Oct '88)
★★★★

DATABASES

Business Filevision is a graphic database. Much more powerful than the original, accepts MacPaint graphics. $395. Marvelin, 3420 Ocean Park Blvd., Santa Monica, CA 90405. NCP (Feb '86)
★★★

C.A.T. is a dedicated relational database for managing contacts, activities and time. Links between types of data make it easy to keep track of important people and events. $399.95. Chang Laboratories, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Nov '87)
★★★★

dBASE Mac is a relational DBMS that includes a structured programming language to develop stand-alone applications. Palette icons as alternatives to menu commands will help novice users. Requires 1 megabyte +. $495. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319. NCP (Feb '88)
★★★★

Double Helix II is a powerful database that supports a multiuser environment with an upgrade. Uses an icon-based development system for easy creation of databases. $595, single-user version. Odesta, 4084 Commercial Blvd., Northbrook, Ill 60062. NCP (Apr '88)
★★★★½

EndNote provides database management for bibliographies. Designed to work in conjunction with a word processor. Allows for formatted in-text citations to be pasted directly into a word-processing document and then creates a bibliography from the citations. Version 1.0 reviewed. $129. Niles & Associates, 2200 Powell St., Suite 765, Emeryville, CA 94608. NCP (Feb '89)
★★★★½

FileMaker II is a multiuser version of the all-time best flat file manager for the Macintosh. New features include more flexible layouts, hierarchical menus, and color on the Mac II. Version 1.0. Requires 1 megabyte with
★★★★½





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MINIFINDERS

two 800K drives or a hard-disk drive. $299. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Dec '88)

4th Dimension is a versatile tool that creates stand-alone relational databases. ★★★★½ Design and layout environments allow easy linking of information. Robust. Pascal-like procedure language. $695. Acius, 20300 Stevens Creek Blvd., Cupertino, CA 95014. NCP (Nov '87) ★'87 Eddy

FoxBASE+/Mac is a relational database that can read unmodified dBASE III ★★★★½ PLUS applications created in the MS-DOS world. Amazingly fast. Good implementation of dBASE on the Mac. Version 1.0. Requires 1 megabyte. Mac II and MultiFinder friendly. $395. Fox Software, Inc., 118 W. South Boundary, Perrysburg, OH 43551. NCP (Sept '88)

MacDewey! is a cataloging program featuring the Dewey Decimal Classification ★★★ system. Uses predefined fill-in-the-blank fields to create catalog cards. Suffers from bugs in search routines and the inability to distinguish first names. Not for professionals; home libraries might benefit. Version 2.5. $79.95. Mousetrap Software, 336 Coleman Drive, Monroeville, PA 15146. NCP (Nov '87)

Omnis 3 is a power database, featuring concurrent-multiple-file management. ★★★★ Can handle 24 files, 12 at a time, and is fully relational. Create custom environments, including user-defined menus, commands, and dialogs. $495. Blythe, 2929 Campus Drive, San Mateo, CA 94403. NCP (Mar '86)

OverVUE is a power-packed relational database that has extensive sorting, sum- ★★★★½ marizing, and report generation capacity. Has macros, and a charting function. Good manual. It can exchange files with a very wide variety of other programs (including IBM software). $295. ProVUE, 222 22nd St., Huntington Beach, CA 92648. NCP (Nov '85) ★'85 Eddy

Pro-Cite is a complete database-management system for bibliographies. Almost ★★★½ unlimited flexibility in the formatting of bibliographies. Full-featured search and sort capabilities. Version 1.3 reviewed. Requires 512KE. $395. Personal Bibliographic Software, Inc., P.O. Box 4520, Ann Arbor, MI 48106. NCP (Feb '89)

Record Holder Plus is a flexible, easy-to-use, form-oriented data manager. Setup ★★★★ is particularly simple and the search features are powerful. $69.95. Software Discoveries, 137 Krawski Drive, South Windsor, CT 06074. NCP (Apr '86) ★'87 Eddy

Reflex for the Mac is a flexible relational database. Excellent report generator ★★★★½ gives full control over appearance, style of output. Requires 512K+, second drive, or hard disk. $99.95. Borland International, 4585 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Dec '86) ★'86 Eddy

Reflex Plus is a relational database with "smart" entry, and report design, but no ★★★★ overall programming facility. Simple to set up, yet fast. Graphic capabilities are quite limited. Version 1.0 reviewed. $279. Borland/Analytica, 4585 Scotts Valley Drive, Scotts Valley, CA 95066-9987. NCP (Feb '88)

Writer's Workshop maintains orderly records for writers. It can track manuscripts, ★★★½ income, and publisher. Based on and includes Runtime Helix. $99.95. Futuresoft System Designs, P.O. Box 132, New York, NY 10012. NCP (Apr '87)

NUMBER CRUNCHING

Data Desk Professional lets you visually look at statistics with more ease than ★★★★½ any comparable Macintosh program. Plots variables so you can analyze data to see what patterns develop. Version 2.0. Requires 1 megabyte and two 800K disk drives or hard disk. $495. Odesta, 4084 Commercial Ave., Northbrook, IL 60062. NCP (Nov '88)

Excel is THE power spreadsheet of the Mac. Has 256-column by 16,384-row ★★★★★ capability. Features include a powerful macro function (with a recorder to make creation simple) and elaborate charting facilities. 512K+ Mac and external drive required. $395. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. NCP (Prem) ★'85 Eddy

MacCalc is a fast, competent, full-featured spreadsheet with impressive built-in ★★★★ functions, font control, on-line help, ability to expand columns and rows, and read/write SYLK or WKS files. The worksheet is 125 columns by 999 rows. A very flexible, pure spreadsheet. $139. Bravo Technologies, c/o DPAS, P.O. Box T, Gilroy, CA 95021. NCP (Sept '86) ★'86 Eddy

MacSpin is a unique and powerful graphic data analysis program. Handles multi- ★★★★ variate data in a highly visual manner. Nothing else like it for any micro. $199.95. D² Software, P.O. Box 9546, Austin, TX 78766-9546. CP (June '86) ★'87 Eddy



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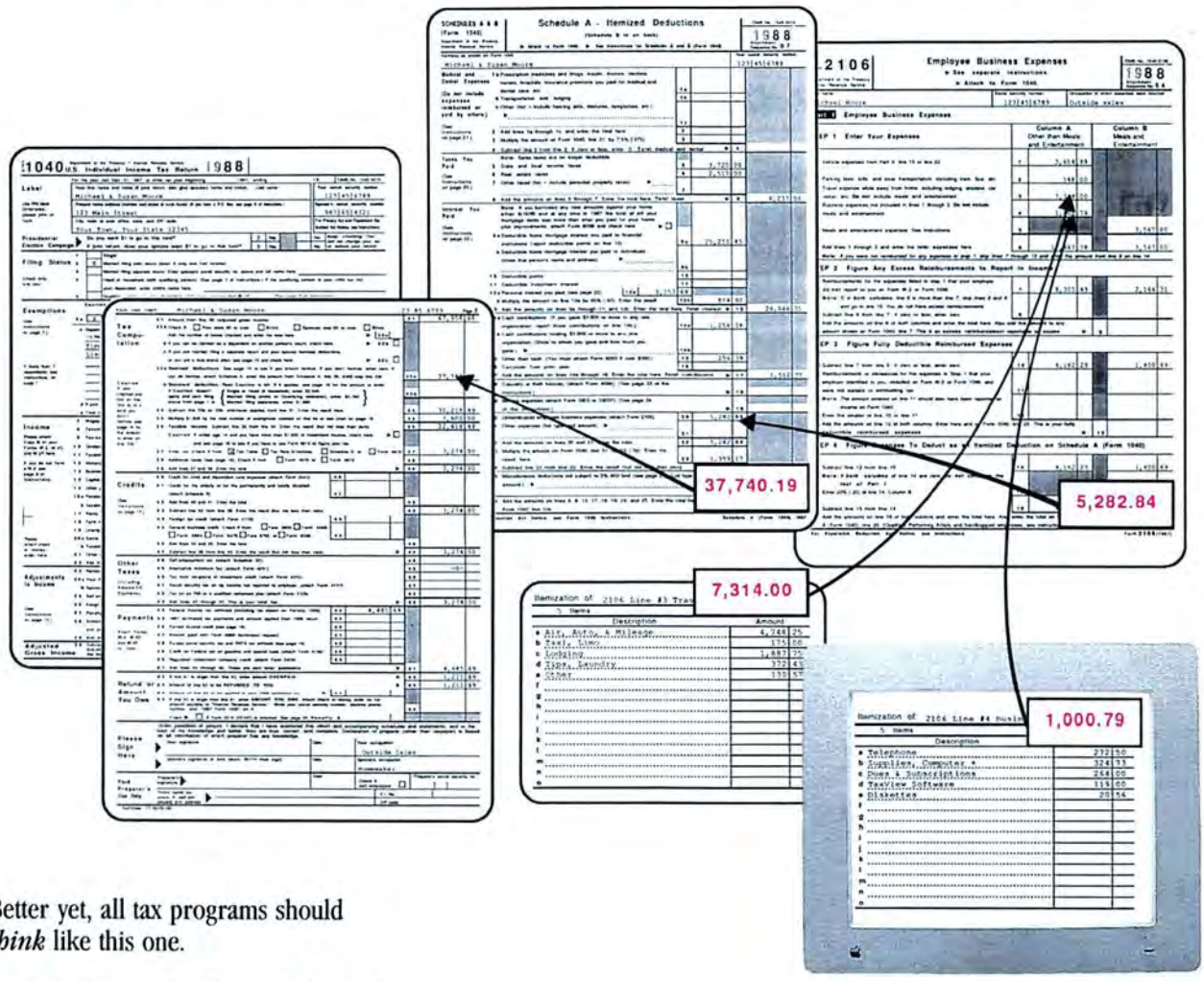
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MINIFINDERS

MacSQZ! compresses Excel files up to 88 percent of their actual size. Good to free ★★★★★ up disk space. Also contains password utility. MultiFinder hostile. Requires Excel. Version 1.01. $79.95. Turner Hall Publishing, 10201 Torre Ave., Cupertino, CA 95014. NCP (Aug '88)

Mathematica is a powerful tool for doing all kinds of math. Offers arbitrary-preci- ★★★★½ sion numeric calculations, symbolic computation, PostScript graphics, and programmability. Version 1.03. Requires 1 megabyte+ and a hard-disk drive. 2 megabytes RAM required to run kernel. $495, $795 for the Mac II version. Wolfram Research, P.O. Box 6059, Champaign, IL 61821. NCP (Nov '88)

MathView Professional is an equation solver that combines two- and three- ★★★★ dimensional plotting with routines for matrices, differential equations and integrals, complex numbers, and the like. Interface leaves a lot to be desired. Version 1.0. Requires 512KE and two disk drives. Mac II and MultiFinder friendly. $249.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP (Sept '88)

Microtemp Financial Calculators is a set of worksheets for Excel and Works that ★★★½ calculates common personal and small business financial problems. Includes cash flow, real estate and rate of return calculators. Version 1.0. $79.95. Microtemp, P.O. Box 1208, Santa Rosa, CA 95402. NCP (Aug '88)

Mindsight is a professional level, decision-support, and business planning pack- ★★★★ age. Can work with IFPS on mainframes, and is able to transmit models in both directions. Powerful and easy to use. Requires 512K+. $249. Execucom Systems, P.O. Box 9758, Austin, TX 78766. CP (Dec '86)

Parameter Manager Plus is a data manager, incorporating integrated scheduling, ★★★★ statistics, and graphics. Solid spreadsheet, calendar, and database functions. Can import data from Excel or Lotus 1-2-3. $595. Rebus, 2330-B Walsh Ave., Santa Clara, CA 95051. NCP (July '87)

StatView 512+ is a very intuitive statistical analysis program with tools needed ★★★★★ to understand any set of data. Holds data in a spreadsheet-like form. Full-featured, fast, and accurate. Extremely wide range of analyses possible. Requires 512K+ and 800K of disk space to operate. $349.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP (Dec '86)

StatView II is a remarkably complete data analysis package. Essential for any kind ★★★★★ of descriptive, comparative, or multivariate statistics. Works in color on the Mac II. Version 1.01. Requires Mac II or SE equipped with 68020 and 68881 math coprocessor; two 800K disk drives or hard disk. $495. Abacus Concepts, 1984 Bonita Ave., Berkeley, CA 94704. NCP (Oct '88)

101 Macros for Excel offers all the power of macros without having to learn how ★★★★ to write them. Some gems include a macro to transpose rows and columns, and a search and replace macro. Requires Excel. $69.95. Macropac International, 19855 Stevens Creek Blvd., Cupertino, CA 95014. NCP (July '88)

GRAPHICS & DESIGN

ArtWare: Borders enables you to customize your own clip art disk. The border ★★★★ collection is the best package in terms of quality of art. Other packages available. Requires a program that reads Encapsulated PostScript Format (EPSF) files. $129. Artware Systems, 3741 Benson Drive, Raleigh, NC 27609. NCP (Aug '88)

Canvas is a Draw and Paint program that uses QuickDraw as its output language. ★★★★½ Full of features, including free rotation and one-and-two-point perspective. Also has graphics macro commands, unusual in a program this inexpensive. $295. Deneba, 7855 N.W. 12th St., Suite 202, Miami, FL 33126. NCP (Jan '88)

Chart can easily create area, bar, column, line, pie, scatter, and combination ★★★½ charts. A total of 42 styles are provided. Limited to 100 data items (64 in a series) on a 128K Mac, approximately twice that on a 512K Mac. $125. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. CP

Click & Clip offers seasonal graphics packages. Of the two quarterly editions ★★★ released, the Spring '88 package is the better collection. Requires a program that reads Encapsulated PostScript Format (EPSF) files. $39.95 per edition. Studio Advertising Art, P.O. Box 18432-52, Las Vegas, NV 89114. NCP (Aug '88)

Comic Strip Factory is an assembly program for creating comic strips. Includes a ★★★★½ database of parts for various characters and backgrounds for panels. Good text editing in balloons. Can import and export in MacPaint format.



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$69.95. Foundation Publishing, 5100 Eden Ave., Suite 307, Edina, MN 55436. NCP (Dec '87)

Cricket Draw is an object-oriented drawing program that will produce stunning, high-quality output. Designed to print on PostScript-compatible devices, such as the LaserWriter. $295. Cricket Software, 40 Valley Stream Parkway, Malvern, PA 19355. NCP (May '87)

Cricket Graph easily generates 12 graph types. Multiple windows can be displayed. Graph prints in up to eight colors with up to 16 patterns. Self-generating macro formatting. Switcher, HFS, LaserWriter, and plotter compatible. $195. Cricket Software, 40 Valley Stream Parkway, Malvern, PA 19355. NCP (June '86) ★'86 Eddy

Cricket Presents is a presentation tool with strong emphasis on graphics. Good master template. Lacks import capability for text. Version 1.0. Requires System 4.2 or later. $695. Cricket Software, 40 Valley Stream Parkway, Great Valley Corporate Center, Malvern, PA 19355. NCP (Nov '88)

Crystal Paint creates an electronic kaleidoscope. It is MacPaint's Brush Mirrors gone wild in a small, simple, yet wonderful application. Does not work in color on Mac II. MultiFinder friendly. Requires 512K+. $49.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Feb '88)

Curator catalogs your art and graphics so it's easy to see what's what and where it is. Supports PICT, TIFF, EPSF, PostScript, MacPaint, and more. Changes creator types. Requires 512K and an 800K drive. $139.95. Solutions International, 30 Commerce St., Williston, VT 05495. NCP (Sept '88)

DeskPaint is a full-blown paint program as a desk accessory. Allows you to spruce up a graphic while in another application. Imports and exports MacPaint and TIFF images. Great for DTP, but not enough features to rival the leaders in paint programs. Zedcor, 4500 E. Speedway, Tucson, AZ 85712-5305. NCP (Mar '88)

EPS Illustrations is a potpourri of illustrations with no real focus. As an art package, this one is not very useful as you cannot alter any of the drawings. Requires a program that reads Encapsulated PostScript Format (EPSF) files. $129.95. T/Maker, 1973 Landings Drive, Mountain View, CA 94043. NCP (Aug '88)

EZ Draft is a high-level CAD application. Does things usually only found on minicomputer programs. Uses "pop-up" menus to supplement a full set of pull-down menus. Comes with an additional set of printer/plotter/monitor drivers. A real powerhouse. $1995. $500 for IEGS module to link to other CAD programs. Bridgeport Machines, 500 Lindley St., Bridgeport, CT 06606. CP (May '87)

FastForms! Construction Kit is both a fast and efficient business forms creator (a drawing program) and a specialized application (and DA) to fill out the data fields in your forms. $149 (U.S.). Shana Enterprises, Advanced Technology Center #105, 9650-20 Ave. Edmonton, Alberta T6N 1G1, Canada. NCP (Nov '87)

Fluent Fonts is a two-disk collection of fonts. Forty-nine different items are included. All install easily in user systems. Most are well executed and some are extraordinarily nice. This is a real bargain for font lovers. $49.95. CasadyWare, P.O. Box 223779, Carmel, CA 93922. NCP

Fontastic is a font editor that features a large editing window with a grid to make positioning easy. Select letters to edit by clicking on a matrix of the font. Allows scaling of existing fonts and previewing the various styles. $49.95. Altsys, P.O. Box 865410, Plano, TX 75086. NCP (Dec '85)

Fontographer is a complex, but excellent laser font creator. The fonts created have 300 bits-per-inch resolution. The fonts are actually downloadable PostScript files. $395. Altsys, P.O. Box 865410, Plano, TX 75086. CP

FreeHand greatly simplifies the drawing of curves, the use of layers and text handling when manipulating PostScript graphics. And it works in color on the Mac II. Requires 1 megabyte and two disk drives. $495. Aldus, 411 First Avenue South, Seattle, WA 98104. NCP (Aug '88)

FullPaint is an expanded version of MacPaint. Features include full-screen drawing, up to four documents open simultaneously, brush editing, and movable tool palettes. $99.95. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319. NCP (June '86) ★'86 Eddy

GraphicWorks 1.1 is a powerful drawing and painting program that creates high-resolution bit-maps. Easels contain graphics, balloons hold text, and both reside on panels. Graphic primitives are now a separate tool. $149.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. NCP (Oct '87)

Illustrator 88 is a professional-level graphics program from the people who defined the PostScript language. Uses templates for precise drawing and detailed artwork. Requires 1 megabyte. $495. Adobe Systems, 1585 Charleston Road, Mountain View, CA 94039. NCP (Oct '88)

Image Club is an overwhelming collection of EPS clip art available on disk and CD-ROM. Comes with a well-designed catalog of images. Requires a program that reads Encapsulated PostScript Format (EPSF) files. $99. Image Club Graphics, 2915 19th St. N.E., Calgary, Alberta, Canada T2E 7A2. NCP (Aug '88)

ImageStudio puts a photo-retouching lab on the desktop. Editable brushes let you modify digitized images in 65 gray levels. Version 1.0 reviewed. Requires 1 megabyte + and two 800K disk drives. Mac II and MultiFinder friendly. $495. Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653. NCP (June '88)

Images with Impact! brings clip art out of the turn-of-the-century woodcut style and into a modern graphic sensibility. "Graphics and Symbols 1" is the first in a series. Requires a program that reads Encapsulated PostScript Format (EPSF) files. $99.95. 3G Graphics, 11410 N.E. 124th St., Kirkland, WA 98034. NCP (Aug '88)

Japanese Clip Art is a two-disk set of extraordinary Japanese clip art. Consists of MacPaint documents and separate fonts. Volume I, Heaven, covers mythological subjects; Volume II, Earth, has secular subject matter. $79.95 each volume; $149.95 each set. Qualitas Trading, 6907 Norfolk Road, Berkeley, CA 94705. NCP (Apr '87)

LaserFonts are new fonts for the LaserWriter. Users download them to their machines. Very high quality and very simple to use. Willamette looks like Avant Garde. MicroFonts provides tiny, expanded, and condensed versions of the LaserWriter's own fonts. $34.95 to $44.95 each. Century Software, 2483 Hearst, #175, Berkeley, CA 94709. NCP

Lasertalk is a PostScript programming tool that establishes interactive contact with laser printers. Preview window and on-line help make it a powerful tool. Requires 1 megabyte + and a PostScript Printer. $249. Emerald City Software, P.O. Box 2103, Menlo Park, CA 94026. CP until registered (May '88)

MacCalligraphy simulates brush painting. User-designed Seals and Touches enable you to design your own signature tool and the style of brush you use. Takes some getting used to. $175. Qualitas Trading, 6907 Norfolk Road, Berkeley, CA 94705. NCP (Feb '88)

MacDraft is an object-oriented graphics program. It sports advanced features such as variable scaling, single-degree rotation, complex arcs, auto dimensioning, and variable zoom/reduction. $269. Innovative Data Design, 2280 Bates Ave., Concord, CA 94520. NCP (Feb '86)

MacDraw is an object-oriented graphics program. Can be used to design forms, create presentation materials, and do technical illustrations. Drawing sizes up to 8 feet by 10 feet are possible. Lacks free notation or zoom-in capabilities. $195. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Nov '85) ★'85 Eddy

MacDraw II updates the venerable object-oriented draw program. Adds dithered and color patterns in its own documents, but doesn't support color in the PICT II format. Version 1.0. Requires 1 megabyte, and two 800K disk drives or hard disk. $395. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Nov '88)

MacGraphics is an overwhelming collection of bit-mapped clip art—13 thematic disks containing 10 megabytes of art. Unfortunately, most pictures are full-page, and reproduction quality suffers when they are reduced. Version 3.0 reviewed. $225. GoldMind Publishing, 12155 Magnolia Avenue, Suite 3-B, Riverside, CA 92503. NCP (Jan '89)

MacPaint hasn't lost its shine after all these years. Version 2.0 supports multiple windows, design templates, and a magic eraser for corrections. It lacks free rotation or distortion talents. Requires 512K and second disk drive. $125. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (July '88) ★'85,'87 Eddy

Mac3D is a feature-laden 3-D program with a MacDraw-like interface. PostScript-resolution shading with six variable light sources, user-definable tools, and many more features. Clumsy interface to rotate objects and camera. Version 2.0. $249. Challenger Software, 18350 Kedzie Ave., Homewood, IL 60430. NCP (Jan '87)

MapMaker is a digital cartographer that charts demographic and marketing information on a geographic basis. Wide variety of maps available, some at an additional cost. Version 3.0. Requires 512K. $349. Select Micro Systems, 40 Triangle Center, Yorktown Heights, NY 10598. NCP (Dec '88)

MGMS: Professional CAD for MacIntosh offers more than 200 functions. Very complete, capable program. Groups, Dimension, Libraries, etc., are standard. Sometimes confusing — designed for experienced, professional CAD user, not the novice. Full plotter support. 512K+. $799. Micro CAD/CAM, 3230 Overland Ave., Los Angeles, CA 90034. NCP (Nov '87) ★'87 Eddy

MiniCad is a pro-level CAD package. Vast array of features, many accessible only through Command/Shift/Option key combinations. Works in 2-D or 3-D with easy transition from one to the other. MacDraw-like interface makes it easy to learn and use. Version 3.0. Requires 512K+. Diehl Graphsoft, 8370 Court Ave., Suite 202, Ellicott City, MD 21043. CP (Oct '87)

Modern Artist 2.0 is still an interesting color paint program and has added a few new features, but there's not enough here to justify the substantial price increase. Requires Macintosh II. $495. Computer Friends, 14250 N.W. Science Park Drive, Portland, OR 97229. NCP (Feb '89)

PictureBase is a powerful graphic librarian. You can store paint and PICT formatted items and attach keywords for later search and retrieval. $69.95. Symmetry, 761 E. University Drive, Mesa, AZ 85203. NCP (Sept '87) ★'86 Eddy

Pixel Paint is a color paint program with customizable palettes and a lot of special effects. Slow Open and Save. Requires Mac II, 2 megabytes, and 8-bit video card. $495. SuperMac Software, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (May '88)

MINIFINDERS

PowerPoint is an easy-to-use desktop presentation tool. Good color schemes. ★★★★ Can send presentations to Genigraphics to produce color 35mm slides. Version 2.0. Requires System 4.1 or later, 1 megabyte and two 800K drives or hard disk. $395. Microsoft, 16011 N.E. 36th Way, P.O. Box 97017, Redmond, WA 98073-9717. NCP (Aug '87)

The Print Shop makes it easy to create greeting cards, signs, banners, and ★★★½ letterhead. Uses its own special graphics and can import Paint files. Hard-disk users get version 1.02 or later. $79.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903. CP (Sept '87)

Space Edit is a 3-D CAD program. Display shows top, front, side, and axonometric ★★★½ views of an object, all at once or one at a time. Has standard CAD features plus zoom, exploded view, animated flyover. Suppression of hidden lines is very slow. Requires 1 megabyte +. $625. Abvent, 9903 Santa Monica Blvd., Beverly Hills, CA 90212. CP (July '87)

StandOut! is a presentation program built like a publishing program, with strong ★★★★ text and graphics support. Automatic text flow around graphics objects. Lacks good graphic examples. Version 1.0. Requires 1 megabyte and two 800K drives or hard disk. $395. Letraset, 40 Eisenhower Drive, Paramus, NJ 07652. NCP (Nov '88)

Studio/8 is a professional-level color paint application for the Mac II. Superior tool ★★★★★ set, elegant interface, excellent performance, and speed. Version 1.0. Requires Mac II and hard disk; 2 megabytes of RAM recommended. $495. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. NCP (Jan '89)

SuperPaint is a powerful, easy-to-use graphics program with all the best features ★★★★½ of MacPaint and MacDraw — and then some. LaserBits provides 300 dpi magnification and there are 40 editable brush shapes. Requires 512K+. $149.95. Silicon Beach Software, 9580 Black Mountain Road, P.O. Box 261430, San Diego, CA 92126. NCP (Feb '87) ★'87 Eddy

Super 3D is a high-power 3-D modeling program with an excellent integrated ★★★★★ interface. Powerful time-saver. Features include animation, import/export of 3-D worlds as text files. Excellent for art, design, or technical work. Version 1.0. Requires 1 megabyte. $295. Silicon Beach Software, 9580 Black Mountain Road, P.O. Box 261430, San Diego, CA 92126. NCP (Jan '88).

Trapeze is a powerful presentation worksheet that combines mathematical func-★★★★½ tions and graphic representation. The interface, which consists of an icon bar, can be awkward to use. Mac II and color supported. Version 2.0. $395. Access Technology, 555C Heritage Harbor, Monterey, CA 93940. NCP (Dec '87)

TrueForm takes a scanned image of a paper form and turns it into an electronic ★★★★½ equivalent, complete with fields for entering data. It can automatically sum numeric fields. Requires external 800K drive. $495; run-time version, $295. Spectrum Digital Systems, 2702 International Lane, Madison, WI 53704-3122. NCP (May '88)

VersaCAD is a powerful CAD program that doesn't show any of its MS-DOS roots. ★★★★ Excellent element manipulation, full plotter support. Library user interface is crude. Requires 1 megabyte +. $1,995. VersaCad, 2124 Main St., Huntington Beach, CA 92648. NCP (July '88)

VideoWorks II is an easy-to-use animation tool — the best available on the Mac. ★★★★½ Has an Overview mode that acts as a slide show carousel for presentations. Works in color on the Mac II. $195. Requires 1 megabyte + and an 800K drive. MacroMind, 1028 W. Wolfram, Chicago, IL 60657. NCP (Mar '88) ★'85, '87 Eddy

VideoWorks II Accelerator compiles VideoWorks II movies to make them run more ★★★★ smoothly. Compensates for the QuickDraw screen display. Version 1.0. Requires 1 megabyte, VideoWorks II; hard-disk drive recommended. $195. MacroMind, 1028 West Wolfram, Chicago, IL 60657. NCP (Dec '88)

VideoWorks II Clip Animation, Clip Charts, Black and White Movies, and Clip ★★★★ Sounds are four separate aids to help you construct movies and business presentations. Requires VideoWorks II. $49.95 to $59.95. MacroMind, 1028 W. Wolfram, Chicago, IL 60657. NCP (Aug '88)

WetPaint consists of two three-disk volumes of very high quality clip art. Also ★★★★★ includes the Art Roundup DA, a good art browser/editor. Volume 1 or 2, $39 each; both volumes, $59. Available in PictureBase format for $15 extra per volume. Dubl-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Sept '87)

World-Class Fonts! comes in two volumes of three disks each. Includes all the ★★★★½ Mac the Knife fonts and a lot more, including two useful utilities. This is now the best collection of ImageWriter fonts available. Each volume:



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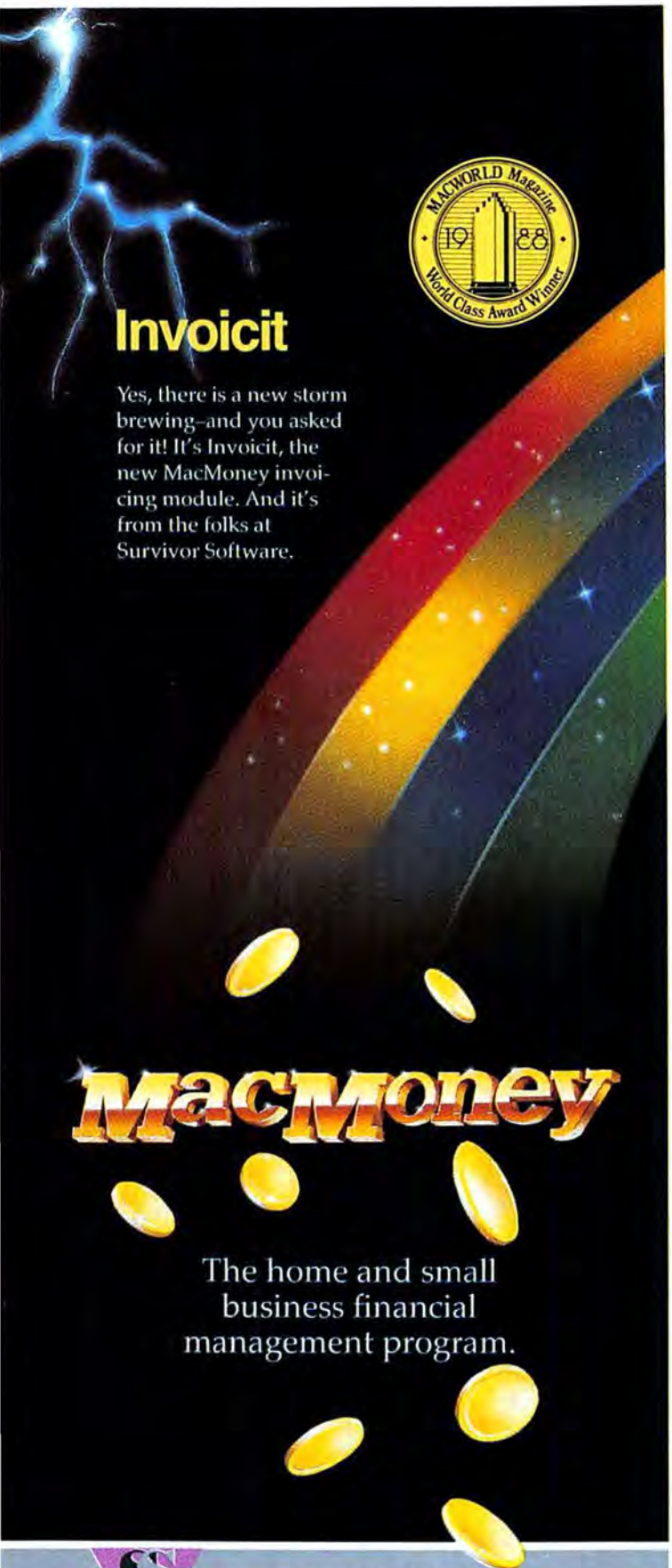
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MINIFINDERS

$39; both volumes: $59. Dubl-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Dec '86)

DESKTOP PUBLISHING

Interleaf Publisher is a speedy multiuser layout system for producing large, complicated documents. Has strong global formatting ability but can't use downloadable fonts. Requires Mac II with 5 megabytes of RAM and 40-megabyte hard disk, $2,495. Interleaf, 10 Canal Park, Cambridge, MA 02141. NCP (May '88)
★★★½

JustText is a professional-level word processor and page makeup program that generates PostScript output. Comes with a set of LaserWriter utilities that allow total manipulation of art and text. Requires LaserWriter or other PostScript compatible output device. $195. Knowledge Engineering, G.P.O. Box 2139, New York, NY 10116. NCP (Dec '85)
★★★½

MacTEX is the TeX environment of choice for hardcore TeX users on the Macintosh. Very intimidating for others. Painfully slow and visually unattractive. Version 2.0. Requires 1 megabyte +. $750. FTL Systems, 234 Eglington Ave. East, Toronto, Ontario M4P 1K5, Canada. NCP (Apr '88)
★★★½

PageMaker retains its paste-up approach to page layout. New features include auto text flow, style sheets, and spot color support. The standard keeps getting better. Version 3.0. Requires 1 megabyte +, and a hard disk. $595. Aldus, 411 First Ave. South, Seattle, WA 98104. NCP (Aug '88) ★ '85, '87 Eddy.
★★★★★

Portfolio: Designs for Newsletters provides more than 20 templates for two-page newsletters with preset columns, headlines, graphics, and captions. Documentation provides excellent tutorial in page design. Requires 512K+; PageMaker. $79.95. Aldus, 411 First Ave. S., Suite 200, Seattle, WA 98104. NCP (May '87)
★★★★

Publishing Packs bundle together three Adobe typefaces that work well for a particular publishing project. The packages offer substantial savings over purchasing the typefaces individually, and the documentation has useful information on typeface characteristics. Newsletters, $395; Forms & Schedules, $475; Presentations, $475. Adobe Systems Inc., 1585 Charleston Road, Box 7900, Mountain View, CA 94039. NCP (Feb '89)
★★★½

QuarkStyle is a collection of 72 designer-created templates for "instant" desktop publishing. The templates, which cover the gamut from business cards to newsletters, let you concentrate on a page's contents rather than its appearance. Version 1.0. Requires 1 megabyte and hard disk. $295. Quark, 1983 Landings Drive, Mountain View, CA 94043. NCP (Feb '89)
★★★★

QuarkXPress is a powerful page-layout program, with 24-bit color, style sheets, and search and replace of text attributes. Also does four-color separations. Layout is done using text and picture boxes, which improves control but is difficult to master. Version 2.0. Requires more than 1 megabyte as well as a hard disk. $795. Quark, 1983 Landings Drive, Mountain View, CA 94043. CP until registered. (Jan '89)
★★★★½

Ragtime is an "Integrated Page Processor" with text, graphics, and built-in spreadsheet. Flow text automatically from one frame to another. Spreadsheet has a full set of functions. Excellent, easy-to-use program. Requires 512K+. $395. Orange Micro, 1400 N. Lakeview, Anaheim, CA 92807. NCP (Aug '88)
★★★★

Ready,Set,Go! 4 has an elegant interface and excellent manual. Powerful text wraparounds, fast word processor with hyphenation and spelling check and custom stylesheets. Requires 1 megabyte +. $495. Letraset, 40 Eisenhower Drive, Paramus, NJ 07652. NCP (Feb '88) ★'86 Eddy
★★★★½

TeXtures is an implementation of TeX, the big daddy of typesetting programs. Good for people trained on mainframes in the early days. Otherwise very sticky with a high learning curve. Version 1.0. Requires 512K+. $495. Blue Sky Research, 534 S.W. Third Ave., Portland, OR 97204. NCP (Apr '88)
★★★

COMMUNICATIONS

AppleShare is the file sharer marketed by Apple. Software-based, AppleShare requires you to dedicate a Mac and a hard disk to run it. Allows users on the network to protect things from other users on the folder level. Interface to network is provided at a revised Finder. $799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (May '87)
★★★★

ComServe allows you to share a Hayes-compatible modem over an AppleTalk network. You can call out, but you can't call in. Works with most telecommunications packages. $195 per server. Infosphere, 4730 S.W. Macadam Ave., Portland, OR 97201. CP (Feb '88)
★★★★

Desktop Express is a simple-to-use, semi-automated program for using MCI Mail and Dow Jones News/Retrieval. Performance is traded off for ease of use. Requires 512K+. $149. Dow Jones, P.O. Box 300, Princeton, NJ 08543. NCP (Jan '88)
★★★½

InBox is an easy-to-use mail system. It's called up from a desk accessory. Has a very slick interface. Dedicated Mac not required. $350 for starter set, which includes one Administrator disk and three Connection disks. Additional Connections cost $125 each. Tops, 950 Marina Village Parkway, Alameda, CA 94501. NCP (May '87) ★'86 Eddy
★★★★½

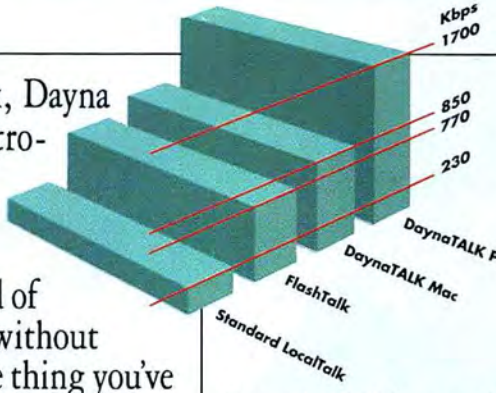
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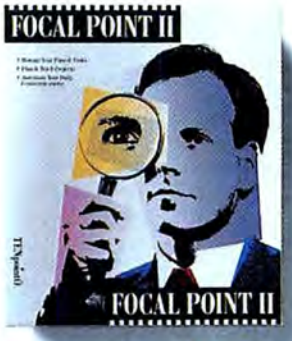
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MINIFINDERS

InTalk comes with its own communications command language able to do unattend-
★★★★½ ed sessions. Supports Xmodem and MacBinary. Has a macro key function. Many sample setup documents and command language files provided. $195. Palantir, 12777 Jones Road, Houston, TX 77070. NCP (Prem)

LapLink Mac quickly transfers data to and from the MS-DOS and Mac environ-
★★★★ ments. Kit contains a cable and software. Control of transfer is on the IBM side. Version 1.2. Requires 512K. $139.95. Traveling Software, 19310 North Creek Parkway, Bothell, WA 98011. NCP (Aug '88)

MacWorkStation is a development environment and communications program
★★★★ that accesses custom mainframe applications through the Macintosh interface. Modular design allows for expandability. Mac II and MultiFinder friendly. Version 3.0. $2,500 for internal use license, $5,000 for commercial use license. Apple Software Licensing, 20525 Mariani Avenue, Cupertino, CA 95014. NCP (Oct '88)

MicroPhone is a high-powered terminal program that's easy enough for novices.
★★★★½ Very powerful command language allows full automation of communications, if desired. $295. Software Ventures, 2907 Claremont Ave., Berkeley, CA 94705. NCP (July '86) ★'86 Eddy

Microsoft Mail is an electronic mail system that runs under AppleTalk. Supports
★★★★½ file transfers across the mail system. Full on-line help facility. Also includes "While you were out" messages. Desk accessory based. Prices determined by number of users licensed. One to four users, $299.95; five to 10 users, $499.95; 11 to 20 users, $749.95; 21 or more users, $949.95. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. NCP (May '87) ★'87 Eddy

PC MacTerm/pcAnywhere III are two programs that work together to take control
★★★★ of an MS-DOS machine from the Mac keyboard. Versions: PC MacTerm 1.1; pcAnywhere III 3.0. Requires 512K; System 4.1 or later; 128K IBM PC compatible and MS-DOS 2.1 or later. PC MacTerm, $99; pcAnywhere III, $145. Dynamic Microprocessor Associates, Inc., 60 East 42nd St., New York, NY 10165. NCP (Jan '89)

Red Ryder is a full-featured telecommunications program that supports MacBin-
★★★★★ ary, Xmodem, and Kermit. Has big screen-support, auto procedure creator, and up to 30 keyboard macros. This is the cream of the crop (in late '87). $80. Freesoft, 150 Hickory Drive, Beaver Falls, PA 15010. NCP (Dec '87) ★'87 Eddy

Smartcom II balances power and ease of use. Capable of unattended operation
★★★★½ and has a very powerful command language. Supports MacBinary, Xmodem, and Hayes Verification protocols. The large-screen buffer can easily be archived. $149. Hayes, 5923 Peachtree Industrial Blvd., Norcross, GA 30092. NCP (July '86) ★'85 Eddy

TOPS is a file server designed to network computers with different operating
★★★★½ systems. Supports Macs, MS-DOS compatibles, and UNIX. Access to files and subdirectories is transparent to the user; they appear as Mac folders. Only handles ASCII or Text files. $249 for Mac version. TOPS, 950 Marina Village Parkway, Alameda, CA 94501. Serial number protected. (May '87) ★'87 Eddy

VersaTerm-Pro is a very powerful terminal program with several special features.
★★★★½ Does one of the best VT100 emulations available and specializes in high-quality Tektronix 4014 and 4105 emulation. A pro's tool. Requires 512K+. $295. Peripherals, Computers & Supplies, 2457 Perkiomen Ave., Mount Penn, PA 19606. NCP (Apr '87)

WORD PROCESSORS

ArchiText is a text processor with many hypertext capabilities, as well as the
★★★★ ability to include graphics. "Nodes" of text are accessed by means of different "maps." Very powerful. Version 1.0 reviewed. Requires 1 megabyte. $349.95. Brainpower, 24009 Ventura Blvd., Suite 250, Calabasas, CA 91302. NCP (Feb '89)

Document Compare allows users to compare any two MacWrite 4.5, ASCII, or
★★★ MDS documents. Differences in spelling, punctuation, formatting, and wording are detected. Documents can be printed out with differences highlighted. $99. Legalware, 33 Young St., Toronto, Ontario M5E 1S9, Canada. NCP (May '86)

Document Modeler can automate much of a professional office's correspon-
★★★★½ dence. Comes in two parts: Template Maker and Document Maker. Initial setup requires time and is complex. $299.95. Legalware, 33 Young St., Toronto, Ontario M5E 1S9, Canada. NCP (Mar '87)

Doug Clapp's Word Tools is a useful punctuation and style-editing program. It
★★★★ won't turn you into a Proust, but it will help you make your writing cleaner and clearer. Word counts among different formats show discrepancies, but not to worry. Requires 512K+. $79.95 Aegis Development, 2125 Pico Blvd., Santa Monica, CA 90405. NCP (Sept '87)

Expressionist is a powerful DA that allows you to create complex mathematical
★★★★★ equations from within an application. Equation manipulation has never been easier. $79.95. Allan Bonadio Associates, 1579 Dolores St., San Francisco, CA 94110. NCP (July '87)

FullWrite Professional combines outlining and word processing with page layout
★★★★ and drawing. Its many features translate into sluggish performance unless you have a lot of extra RAM. Impressive. Version 1.0. Requires 1

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MINIFINDERS



megabyte. Mac II and MultiFinder friendly. $395. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502. NCP (Sept '88)

Graham Speller is a desk accessory-based spelling checker. Includes macro feature. Good guesser in interactive mode. Clumsy interface. Version 1.1. $44.95. Graham Software, 8609 Ingalls Circle, Arvada, CO 80003. NCP (Sept '88)

Kadmos Greek Font is a full character set of ancient Greek that prints on any PostScript printer. Requires learning new typing skills, but excellent quality makes it worth the effort. $85. Allotype Typographics, 1600 Packard Road, Ann Arbor, MI 48104. NCP (Oct '87)

Laser Author is a high-powered, technically oriented word processor. Good math-setting capability. Has style sheets, word count, and page layout capability. $199.95. Firebird Licensees, P.O. Box 49, Ramsey, NJ 07446. NCP (Mar '87)

Liberty Spell Checker is a fast, effective, interactive checker. The dictionary is smaller than average, but well chosen. Unfortunately, it has a few misspelled words. $59.95. DataPak, 14011 Ventura Blvd., Sherman Oaks, CA 91423. CP (Oct '86)

Lookup is an on-call, quick, single-word spelling checker. Designed for the way writers really work. Uses the 93,000+ word Spellswell dictionary. $49.95. Working Software, 321 Alvarado, Suite H, Monterey, CA 93940. (Dec '87) NCP

MacGAS is a DA spelling checker with both a small and extended dictionary. Its best point is the excellent thesaurus. Provides antonyms and glossary. A slow checker. $99. EnterSet, 2380 Ellsworth, Berkeley, CA 94720. CP (Oct '86)

MacProof is a grammar, style, and spelling checker that's like having your own personal copy editor. Grammar rules are fixed, and you may not agree with the choices. The program only suggests corrections, it doesn't make them for you. And the checking process can be slow if your document is long. $195 for stand-alone version; $2,500 for networked version. Automated Language Processing Systems, 190 W. 800 North, Provo, UT 84604. NCP (Apr '87)

Macspell+ is a spelling checker that installs as a desk accessory. Works easily with MacWrite 4.5 and 2.2 and Word, but has some drawbacks. New version 1.10 just available. Requires 512K+, two drives or hard disk. $99. Creighton Development, 16 Hughes St., Irvine, CA 92718. NCP

MacWrite is starting to show its age. While still a good, basic program, it's outperformed by its competition. Probably enough for the occasional user. Version 5.0 includes command key equivalents and spelling checker. Requires 512KE+. $125. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (June '88) ★'85 Eddy

MergeWrite is a mail-merge program for MacWrite (also works with ASCII files). Program combines names and addresses from a data file into predefined fields in a form letter. Also allows simple conditional IF-THEN-ELSE equations. $49.95. Software Discoveries, 137 Krawski Drive, South Windsor, CT 06074. NCP (Dec '87)

MindWrite integrates outlining and word processing better than anyone. Version 1.1 fixes many problems of the earlier version. Sophisticated search and select options. Unimpressive speed. $295. Access Technology, 555C Heritage Harbor, Monterey, CA 93940. NCP (Feb '88)

QUED/M is an excellent text editor that saves documents in a form readable by most computers and printers. Doesn't support graphics or multiple fonts. Programming language allows creation of database. Version 2.01. $129. Paragon Concepts, 4954 Sun Valley Road, Del Mar, CA 92014. NCP (Mar '88)

Scriptor is designed for producing standard-format scripts. Starts with a Word document. As you change your Word document, Scriptor will reformat, renumber, and reprint the script. Supports LaserWriter and daisywheel printers. $295. Screenplay Systems, 348 E. Olive Ave., Suite F, Burbank, CA 91502. NCP (May '87)

Sensible Grammar corrects some of the more glaring errors that writers make. Also analyzes the word count and structure of sentences to come up with a readability rating. Slow. Version 1.1d. Requires 512K. $99.95. Sensible Software, 335 E. Big Beaver, Suite 207, Troy, MI 48083. NCP (Dec '88)

Spelling Champion is a fast and accurate batch-type spelling checker. Back-up feature allows you to undo corrections in a paragraph. Works only with MacWrite 4.5. $39.95. Champion Software, 6617 Gettysburg Drive, Madison, WI 53705. NCP (Oct '86)

Spelling Coach Professional is a desk accessory and stand-alone spelling checker as well as thesaurus. Includes dictionary definitions. Off-the-wall phonetic guesses. Version 3.0. $195. Deneba Software, 7855 N.W. 12th Street, Suite 202, Miami, FL, 33126. NCP (Sept '88)

Spellswell is a stand-alone batch spelling checker. Also checks for punctuation and other errors. Good dictionary, thorough checking, simple interface. Weak guessing. Version 2.0. $74.95. Working Software, P.O. Box 1844, Santa Cruz, CA 95061. NCP (Sept '88) ★'86 Eddy

Thunder! is a desk accessory spelling checker. Includes macro features. Fairly fast, good guessing of misspelled words. Small dictionary. MultiFinder hostile. Version 1.1. $49.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. NCP (Sept '88)

Word Finder is an electronic thesaurus that won't replace your trusty Roget's, but is still useful for checking synonyms on the fly. Large, respectively. Version 2.0. Requires 512K. Mac II and MultiFinder friendly. $59.95. Microlytics, 300 Main St., Rochester, NY 14445. NCP (Sept '88)

Word 3.02 is the most feature-laden word processor around. Also has Microsoft's somewhat unusual view of what the Mac interface is. Esoteric command key combinations. Requires 512K+. $395. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073. NCP (Mar '88)

WordPerfect is a good choice for offices needing compatibility, but not so hot otherwise. Good internal file-management system and macro maker. Uses hidden formatting codes, hierarchical menu system. Requires Mac 512KE, System 4.1 or later. Two 800K disk drives or a hard disk recommended. Not fully compatible with System 6.0. $395. WordPerfect, 1555 N. Technology Way, Orem, UT 84057. NCP (Feb '89)

WorksPlus Spell is a speedy spelling and hyphenation checker for Microsoft Works. It includes a glossary for abbreviations and time/date stamping. The biggest drawback is its limitation to one program. $59.95. Lundeen & Associates. P.O. Box 30038, Oakland, CA 94604. NCP (Oct '87) ★'87 Eddy

Write is a "beginner's" version of Word 3.0. More features than some word processors in its class, but not all of the features work well. Poor value, and expensive upgrade path to Word. $175. Requires 512K+. Microsoft, 16011 N.E. 36th Way, P.O. Box 97017, Redmond, WA 98073-9717. NCP (May '88)

WriteNow for the Macintosh has many of the features of MacWrite and then some, including the ability to work in columns. Has built-in spelling checker with 50,000-word dictionary. $175. T/Maker, 1973 Landings Drive, Mountain View, CA 94043. NCP (Mar '87)

SYSTEM SOFTWARE

HyperCard is a totally unique program for the Mac. It uses an index-card metaphor and it contains a programming language, HyperTalk. Requires 1 megabyte +. Free with new Macs and bundled with many HyperCard stacks, otherwise $49.95. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (Dec '87) ★'87 Eddy

SoftPC puts an IBM PC/XT inside your Mac without cracking the case to add any special coprocessor boards. The emulation of an MS-DOS machine is done entirely in the software. Version 1.2. Requires Mac II or SE equipped with 68020 accelerator card; 2 megabytes of RAM. $595. Insignia Solutions, 1255 Post St., Suite 625, San Francisco, CA 94109. NCP (Nov '88)

System Tools 5.0 is the Apple System upgrade for Mac Plus, SE, and II owners. It contains MultiFinder (a multitasking environment), a LaserWriter spooler, and a Control Panel resource to add color on the Mac II desktop. Requires 1 megabyte +. $49. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (Mar '88)

System Tools 6.0 contains an improved version of MultiFinder and new features like CloseView (for visually impaired users), Map, and MacroMaker. Incompatible with many programs; lots of small bugs. Requires 1 megabyte. $49. Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014. NCP (Nov '88)

HYPERCARD

Business Class is a HyperCard stack that contains world travel information and itinerary planning. Uses maps to locate countries of interest, but it lacks United States domestic travel information. Requires 1 megabyte + and HyperCard. $49.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. NCP (Mar '88)

City to City imparts travel information on 31 U.S. cities including details on hotels, restaurants, and nightlife. Helps plan an itinerary. Requires HyperCard, two disk drives, and a printer. $49.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. NCP (Sept '88)

Focal Point is a HyperCard stack that ties together a calendar, phone log, client accounts, and more in one easy-to-use organizational tool. Requires 1 megabyte + and HyperCard. $99.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. NCP (Mar '88)

HyperAnimator enables you to create talking heads for your HyperCard stacks. Use MacinTalk or provide digitized sounds. Easy to implement. Version 1.0 reviewed. Requires 1 megabyte, System 6.0, HyperCard. $149.95. Bright Star Technology, Inc., 14450 N.E. 29th, Suite 220, Bellevue, WA 98007. NCP (Feb '89)

HyperAtlas is a collection of U.S. and World maps that are networked to stacks containing economic, political, and population data. Version 1.0. Requires HyperCard and second disk drive or hard disk. $99. MicroMaps Software, P.O. Box 757, Lambertville, NJ 08530. NCP (Oct '88)

HyperDA lets you browse through HyperCard stacks through a desk accessory. A true equalizer for 512K Mac owners who cannot normally access stackware. Doesn't support global variables. Requires 512K+. $69. Symmetry, 761 E. University Drive, Mesa, AZ 85203. NCP (May '88)

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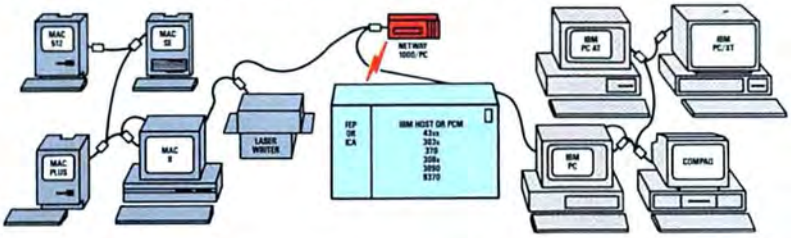
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MINIFINDERS



HyperTutor is a stack that teaches HyperTalk, Hypercard's programming lan-
★★★★½ guage. Uses an interactive Test Mac on each card to write scripts. A variety of windows makes it good for both beginners and advanced programmers. $49.95. Channelmark, 2929 Campus Drive, San Mateo, CA 94403. NCP (Apr '88)

Macintosh Bible: STAX! Edition is a collection of Macintosh tips in a stack, based
★★★ on the book by Coleman and Naiman. Version 1 reviewed. Requires 1 megabyte, second 800K drive, HyperCard. $79.95. STAX!, 8008 Shoal Creek Blvd., Austin, TX 78758. NCP (Mar '89)

Reports endows HyperCard stacks with the power to sort and impart information
★★★½ like a database. Customizing reports is difficult. Requires HyperCard. $99.95. Activision, Inc., 3885 Bohannon Drive, Menlo Park, CA 94025. NCP (Aug '88)

ScriptExpert helps you generate HyperTalk scripts by leading you through the
★★★★ correct use of the language. Select a common command, and dialog boxes prompt you for necessary components. Version 1.0. Requires HyperCard. $79.95. Hyperpress Publishing, P.O. Box 8243, Foster City, CA 94404. NCP (Oct '88)

VideoWorks II HyperCard Driver lets you play movies directly from a stack. One
★★★½ way to add color animation to HyperCard. Version 1.0. Requires 1 megabyte, VideoWorks II, and HyperCard; hard-disk drive recommended. $99.95. MacroMind, 1028 West Wolfram, Chicago, IL 60657. NCP (Dec '88)

ORGANIZATIONAL TOOLS

Acta is an outline processor in desk accessory format. It has practically all the
★★★★½ power of a stand-alone program, and then some. Can save files as Acta outlines, MacWrite files, or text files. Version 2.0. $79. Symmetry Corporation, 761 E. University Drive, Mesa, AZ 85203. NCP (Oct '88)

Comment is an electronic version of Post-it Notes. A mini-word processor lets
★★★★ you attach notes to a spreadsheet cell, to words in a text document, or to a window on the desktop. Version 2.0. Requires 512KE. $99.95. Deneba Software, 3305 N.W. 74th Ave., Miami, FL 33122. NCP (Dec '88)

Design is a powerful organizational tool. It goes beyond mere flowcharting. Graphi-
★★★★½ cally depicts relationships between systems. Complex, detailed program aimed at software pros. $250. Meta Software, 150 Cambridge Park Drive, Cambridge, MA 02140. NCP (Apr '88)

FamilyCare is a "yuppie" handbook to childhood diseases. The rule-based expert
★★★ system gives advice based on symptoms. Ailments and diseases run the gamut from acne and appendicits to wheezing and yeast infections. Lacks graphics. Version 1.0. Requires 512K. $99. Lundin Laboratories, 29451 Greenfield Road, Southfield, MI 48076. Mac II and MultiFinder friendly. NCP (Sept '88)

FlowMaster charts your ad dollars in print, TV, billboard, and other mediums.
★★★★★ Analyzes cost/benefit of a campaign in terms that even jaded Mad. Ave. execs will find innovative. Includes bar-chart and tabular output. Requires 512K+. $495. Select Micro Systems, 40 Triangle Center, Yorktown Heights, NY 10598. NCP (Jan '88)

For the Record is a database specifically designed for legal, financial, and person-
★★★★ al records. Allows password locking of screens containing sensitive personal data. Version 1.0 reviewed. Requires 512KE. $49.95. Nolo Press, 950 Parker St., Berkeley, CA 94710. NCP (Feb '89)

FormSet: Business Forms Edition brings a wealth of business forms, such as
★★★ expense reports and profit/loss statements, into the electronic arena. Fields are automatically calculated. Can't be customized beyond adding logo. Version 1.0. Requires 512KE and two 800K floppy drives or hard disks. $95. SoftView, 4820 Adhor Lane, Suite D, Camarillo, CA 93010. NCP (Jan '89)

GeoQuery puts your database on the map by accessing zip code information.
★★★★ Comes with maps of the U.S. Other atlases available. Version 1.0 reviewed. Requires 1 megabyte + and second disk drive. $349. Odesta, 4084 Commercial Avenue, Northbrook, IL 60062. NCP (July '88)

Guide allows you to "cross reference" from within a document using hypertext. You
★★★★½ can set up words or sections of the document so that double-clicking brings up explanatory material, graphics, and other useful items. The word processing and formatting functions, however, are limited. $135. OWL International, 14218 N.E. 21st St., Bellevue, WA 98007. NCP (Apr '87)

Inspiration's flowcharting tools let you free-associate ideas visually, then auto-
★★★ matically dump the flowchart into a text outline. Version 1.0. Requires 512KE and an 800K drive or a hard-disk drive. $149. Ceres Software, 9498 S.W. Barbur Blvd., Suite 103, Portland, OR 97219. NCP (Dec '88)

Instant Expert is an excellent way to learn the mechanics of creating an expert
★★★½ system. The inference engine (that ultimately finds the answer) is visible. Lacks a true Mac interface. Version 1.0. $49.95. Human Intellect Systems, 1670 S. Amphlett Blvd., Suite 326, San Mateo, CA 94402. NCP (Jan '88)

MacProject allows a user to plan and track a project from beginning to end. Uses
★★★ CPM to produce schedules with start and finish dates for each task. Can report on resource interdependencies and generate all needed printed reports. $195. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Mar '86)

MacSMARTS can create small, stand-alone expert systems. Features hypertext
★★★ connections to Paint, PICT, SYLK, and text files. Still a little buggy. Version 1.03. Requires 512K+. $149.95. Cognition Technology, 55 Wheeler St., Cambridge, MA 02138. NCP (Jan '88)

MBA Series is a set of 11 multiuser business applications that run under ACIUS'
★★★★ 4th Dimension. Well designed and useful. Requires 1 megabyte, second disk drive, and 4th Dimension. $189 per application, unlimited users. Generation Four, 3232 San Mateo N.E. #199, Albuquerque, NM 87110. NCP (Mar '89)

Microsoft Works is an integrated application that includes word processing,
★★★★½ database, spreadsheet, and telecommunications functions. The telecommunications module includes both background up- and downloading. $295. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. NCP (Oct '86) ★'86 Eddy

MORE is an incredibly powerful outline processor with gobs of great features:
★★★★★ instant charts, math capabilities, multiple windows, font and style control, templates, and more. Prints outlines in any of several standard formats, even in color. Requires 512K+. $395. Symantec, 117 Easy St., Mountain View, CA 94043. NCP (Jan '87) ★'86 Eddy

QuickDex keeps your phone numbers in an electronic Rolodex. The desk accesso-
★★★★½ ry even plays the tone through the Mac's sound port. Version 1.4a. Requires 512KE; hard disk is recommended. $60. Casady & Greene, P.O. Box 223779, Carmel, CA 93922. NCP (Jan '89)

STELLA for Business is a simulation tool used to model complex business sys-
★★★★½ tems. Requires that you master a discipline called "system dynamics." Requires 512K+. Mac II version available. $350. High Performance Systems, 13 Dartmouth College Highway, Lyme, NH 03768. NCP (June '88)

SuperExpert is an expert system shell that induces rules from examples. Rules
★★½ become unwieldy when many criteria and examples are used. Overpriced. Version 1.4 reviewed. Requires 512KE. $199.95. Softsync, 162 Madision Avenue, New York, NY 10016. NCP (July '88)

WillMaker is a simple yet valuable run-time BASIC program for creating simple
★★★½ wills. Not elegant, but it does the job well. Version 3.0 reviewed. Requires 800K disk. $59.95. Nolo Press, 950 Parker St., Berkeley, CA 94710. NCP (Mar '89)

UTILITIES

AutoMac III is similar to Tempo II and Apple's MacroMaker but is generally easier
★★★½ to use and comes with excellent documentation and a powerful Macro Editor. Version 2.0 reviewed. Requires 512KE. $79.95. Also distributed with Microsoft products (Word 3.02 and 4.0, File 2.0). Genesis Micro Software, P.O. Box 6236, 17124 N.E. Eighth Place, Bellevue, WA 98008. NCP (Feb '89)

AutoSave DA is insurance against system crashes. It saves your work automati-
★★★ cally at intervals from 1 to 99 minutes. Compatible with many applications, but not recommended for use with databases. $49.95. Magic Software, 1706 Galvin Road S., Bellevue, NE 68005. NCP (Jan '88)

CalendarMaker creates monthly calendars in a variety of formats. Users can
★★★★½ incorporate their art and daily notes. Note files can be imported from a variety of DA calendars and outliners. Shareware and prelicensed versions available. $49.95. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Dec '86)

Capture saves any portion of a Macintosh screen to the Clipboard or as a PICT file.
★★★★★ Works in color on the Mac II. Requires 512K+. MultiFinder friendly. $59.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (June '88)

Colorizer adds pigments to the desktop and black-and-white applications. Also
★★★ colors PICT graphics. System resources include saving and printing color screens. A useful novelty that'll run its course as developers add color to apps. Requires Mac II. $49.95. Palomar Software, P.O. Box 2635, Vista, CA 92083. NCP (Jan '88)

Copy II for the Macintosh is a collection of powerful yet easy-to-use disk utilities.
★★★★ Disk copying and much more. Version 7.2 reviewed. Requires 512K. $39.95. Central Point Software, 15220 N.W. Greenbrier Parkway #200, Beaverton, OR 97006. NCP (Mar '89)

DiskExpress optimizes hard-drive performance by reorganizing fragmented files.
★★★★★ Best of its kind. Version 1.5. Requires 512K. $49.95. ALSoft, P.O. Box 927, Spring, TX 77383. NCP (Jan '89)

DiskFinder searches disks for files as well as cataloging disks. Requires 512KE.
★★½ $49.95. Williams & Macias, South 3707 Godfrey Blvd., Spokane, WA 99204. NCP (Feb '89)

DiskFit is a utility for backing up and restoring hard disk files. Creates a "Smart-
★★★★½ Set" of floppy disks so incremental back-ups only update files modified since the last back-up procedure. Backs up to floppies or another hard

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MINIFINDERS



disk. Requires 512KE+. $99.95. SuperMac Software, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (June '87)

DiskQuick is an easy-to-use cataloging program. Criteria selection option for generating subcatalogs. Requires 512K+. $49.95. Ideaforms, P.O. Box 1540, Fairfield, IA 52556. NCP (Apr '87)

Disk Ranger is a speedy cataloging program that doubles as an efficient label-maker. Comes with pinfeed labels. Works with regular and hard disks. Can catalog HFS systems. $34.95. Graham Software, 8609 Ingalls Circle, Arvada, CO 80003. NCP (Mar '86)

DiskTools Plus is a set of eight useful DAs and applications. Earlier version was sold as Battery Pak. The DA Disk Tools II is a Finder replacement. Also included are an RPN calculator, Phone Pad, and Calendar Manager. Requires 512K+. $49.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. NCP (Mar '88)

DiskTop is a desk accessory Finder replacement of extraordinary power and ease of use. Comes with the useful LaserStatus DA and Widgets application. The extras alone are worth the price. Requires 512K+. Upgrade from version 1.0, $7; $10 with new manual. $49.95. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Aug '87)

Dubl-Click Calculator Construction Set lets users design personalized calculators with a variety of standard and special functions. Finished calculators can be saved as installable desk accessories or as clickable applications. $59. Dubl-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Apr '86)

Eureka: The Solver is a free-form numerical equation solver. Standard trigonometric and logarithmic functions are available, as is treatment of imaginary and complex numbers. $195. Borland International, 4585 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Mar '88)

Fastback for the Macintosh is hard disk back-up software that is very quick, if not very efficient. Doesn't automatically exclude applications. Creates a separate catalog disk. $99.95. Fifth Generation Systems, 1322 Bell Ave., Tustin, CA 92680. NCP (Apr '88)

FedIt Plus is the file and disk editor for everyone, from newest Mac owner to oldest. It can do more for your disks and files than any other application. Can recover deleted MFS files. If you own a Mac, get it. HFS-compatible. $49.95. MacMaster Systems, 108 E. Fremont Ave., #37, Sunnyvale, CA 94087. NCP (Sept '86) ★'86 Eddy

Findswell is an indispensible utility that installs a new button in the Open Dialog box of virtually every Macintosh application. Press the button, type a search string, press Find, and Findswell searches for any files that match. Click Open or double-click to open the correct file. Requires 512K+. $49.95. Working Software, P.O. Box 1844, Santa Cruz, CA 95060. NCP (Nov '87) ★'87 Eddy

1stAid Kit HFS recovers lost or damaged files from floppy or hard disks. An excellent manual-turned-textbook actually teaches the Hierarchical File System. Requires 1 megabyte +. Version 2.2 reviewed. $99.95. 1st Aid Software, 42 Radnor Road, Boston, MA 02135. NCP (June '88)

FlashBack is a utility to back up HFS hard disks onto floppies. A unique graphic display of the HFS directory facilitates file selection. The program can handle files larger than 800K. $59.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (Nov '86)

Font/DA Juggler Plus gives you unlimited access to almost any number of fonts, desk accessories, and sounds. Uses hierarchical menus. $59.95. ALSoft, P.O. Box 927, Spring, TX 77383. NCP (May '88)

Glue adds a print-to-disk capability to many programs. ImageSaver installs as printer driver; Viewer allows copying and printing of Glue files. Handy utility for desktop publishers. $59.95. Solutions International, P.O. Box 989, Montpelier, VT 05602. NCP (Dec '86)

Hard Disk Util uses patch files to allow users to mount and run specified programs on their hard disks. The list of patches is constantly expanding. $89.95. FWB Software, 2040 Polk St., San Francisco, CA 94109. NCP

HFS Backup ranks as one of the preferred hard disk back-up utilities. Back up by file/folder or last changes. Back-up specifications can be saved as templates. Good graphic interface. Reliable program. $49.95. PCPC, 4710 Eisenhower Blvd., Tampa, FL 33634. NCP (Dec '86)

HFS Locator Plus is *the* essential HFS desk accessory. It can search for a file by name or date of creation, create folders, move files from one folder to another, set a program to launch while in an application. $39.95. PBI Software, 1163 Triton Drive, Foster City, CA 94404. NCP (Sept '86)

Icon-It! lets you create icons to use as an alternative to menu commands. Comes with 47 icon templates or you can create your own. Version 1.0. $79.95. Olduvai Software, 7520 Red Road, South Miami, FL 33143. NCP (Feb '88)

LabView is a graphical programming environment that creates "virtual instruments" to perform calculations, acquire laboratory data, and control instrumentation. Slow. Version 1.1 reviewed. $1900. National Instruments, 12109 Technology Blvd., Austin, TX 78727-6204. NCP (July '88)

LaserServe is a printer spooler for AppleTalk networks. After installation all operations are done via a desk accessory. Works with both MacServe and TOPS. Requires 512K+ and 800K drive or hard disk. $95 per node. Infosphere, 4730 S.W. Macadam Ave., Portland, OR 97201. NCP (Feb '87)

Mac Disk Catalog II is a utility that will quickly organize a moderate-size disk library. Easy to use with powerful reporting and label-making features. $49.95. New Canaan MicroCode, 136 Beech Road, New Canaan, CT 06840. NCP (Dec '85)

MacFlow is a design tool created for programmers. Traditional flowcharting symbols are linked together, and a symbol can be connected to a separate flowchart file. Now supports custom symbols. $125. Mainstay, 5211-B Derry Ave., Agoura Hills, CA 91301. NCP (Apr '87)

MacInUse tracks time spent in applications and saves info as text files. Installs on any disk, works in background. MFS, HFS compatible. Extremely valuable for tax purposes, client records, etc. $79. SoftView, 4820 Adohr Lane, Camarillo, CA 93010. NCP (Jan '87) ★'86 Eddy

MacLabeler lets users instantly index and print labels for all the disks in a burgeoning collection. Choose border type and orientation of your label; index by folder or document. Starter set of labels is included. $49.95. Ideaform, P.O. Box 1540, Fairfield, IA 52556. NCP (Prem)

MacNosy is a global disassembler. A very advanced user can use this program to look into the code of virtually any program. This advanced tool can take you places no other Mac program could dream of going IF you have the skill to guide it. The documentation is sparse. For pros only. $170, SE and Plus; $350, Mac II. Jasik Designs, 343 Trenton Way, Menlo Park, CA 94025. NCP

MacSafe is a data file security program that allows you to place multiple files into a "safe," and then you can further protect them through two types of encryption (including DES). Flexible and very easy to use. Allows for installation on hard disk. $149.95. Kent Marsh Ltd., 1200 Post Oak Blvd., Houston, TX 77056. CP (Mar '87)

MacServe converts a Mac and a hard disk into a disk and print server. Uses the AppleTalk network and is easily hooked up. Users can partition the hard disk into multiple volumes. Runs in the background, so users can work on all machines in the network. $250. Requires 512+. Infosphere, 4730 S.W. Macadam, Portland, OR 97201. CP

MacTree displays your files in the form of a hierarchical tree. Good idea, poor performance. Can't view tree easily. Good search function. Requires 512K+. $69.95. Software Research Technology, 22901 Mill Creek Drive, Laguna Hills, CA 92653. NCP (Apr '88)

MacZap is a three-part disk and memory utility. It can be used to recover some damaged files and disks, compare disks, analyze disk structure, and make back-up copies of most disks. $60. Micro Analyst, 2505 Roxmoor, Austin, TX 78723. NCP (Jan '86)

Menu Fonts displays the names of fonts in the actual font instead of standard Chicago. Won't work with programs that have a nonstandard Font menu or no Font menu. Comes with LockOut, a utility that gives password access to your Mac, and FastFormatter, a utility for formatting multiple blank disks. Requires 512K+. $15. Beyond Software, 6069 E. Grant Road, Tucson, AZ 85712. NCP (July '87)

MockPackage+ is a set of extremely powerful DAs. Includes a text editor, text printer (supports LaserWriter), charter, terminal, and EZmenus. HFS compatible. $35. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Mar '87)

myDiskLabeler is an excellent label maker. It can read directories and use large or small icons or anything desired. Comes with 54 precut labels. $44.95; with color printing ability (on the ImageWriter II), $54.95; with PostScript font capability (on the LaserWriter), $64.95. Williams and Macias, P.O. Box 19206, Spokane, WA 99219. NCP (Aug '87)

'Ncryptor is a simple, safe program that lets users password-protect their files. The same program is used for encoding and decoding. This is one of the best products in its category. $39.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP

NightWatch locks up your hard disk by using a floppy start-up disk that acts as a key. Type in the correct password, and access to the hard disk is allowed. Version 1.02. Requires 512KE, a hard disk, and an 800K drive. Mac II and MultiFinder friendly. $149.95. Kent Marsh Ltd., P.O. Box 460289, 1200 Post Oak Blvd., Suite 210, Houston, TX 77056. NCP (Sept '88)

On Cue lets you switch applications without returning to the Finder. Under MultiFinder, active applications are listed on a pop-up menu. Can also launch directly to a specific document. Version 1.0. Requires 512K. Mac II and MultiFinder friendly. $59.95. ICOM Simulations, 648 South Wheeling Road, Wheeling, IL 60090. NCP (Sept '88)

PowerStation is an extremely easy-to-use, versatile and powerful Finder substitute. Loaded with powerful features. Comes with Pyro! $59.95. Fifth Generation, 1322 Bell Ave., Tustin, CA 92680. NCP (Dec '87)

Printworks for the Mac is a comprehensive software-based dot-matrix printer control system. Optimizes printing from different applications, and is easy to use. Requires 512K+. $75. SoftStyle, 7192 Kalanianaole Highway, Honolulu, HI 96825. NCP (Aug '87)

Programmer's On-line Companion puts an abridged version of *Inside Macintosh* in your system for reference. Simply read the text or transfer some or all of it directly into your normal editing window. Non-Mac–ish interface makes the program confusing, somewhat difficult to use. $34.95. Addison-Wesley, Route 128, Reading, MA 01867. NCP (July '87)

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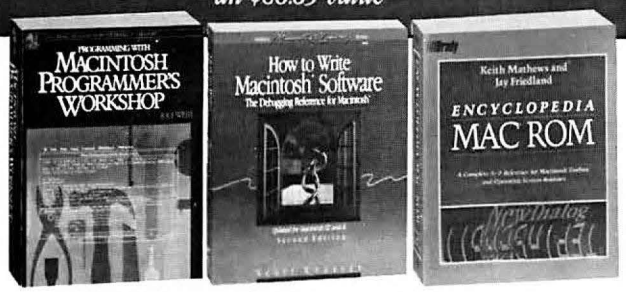


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THE FULLY POWERED MAC *by Robert Eckhardt*—Tips, strategies, and public-exchange programs for installing Fkeys, adding your signature to PostScript fonts, changing arrangement of icons and lists, automating start-up routines, and more. Includes a disk. Publisher's Price: $39.95

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MINIFINDERS

Quick & Dirty Utilities, Volume One is a disk full of handy programs. Several desk
★★★★½ accessories include a menu bar clock and a terminal emulator. $39.95. Dreams of the Phoenix, P.O. Box 10273, Jacksonville, FL 32247. NCP (Nov '85) ★'85 Eddy

QuicKeys lets you make full use of your keyboard. Assign any command (menu
★★★★ choices, DAs, etc.) or series of text blocks and/or command to any key or key combination. Enormously powerful; necessary for Apple Extended Keyboard owners. Requires 512K+. $99.95. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Jan '88) ★'87 Eddy

RamSnap is a RAM disk and disk cache in one easy-to-use package. Can store
★★★★ multiple configurations as files. Good product but a little pricey. $30. Dove Computer Corp., 1200 North 23rd St., Wilmington, NC 28405. NCP (June '87)

Read-It! is the best consumer value in optical character recognition software.
★★★★ Works with any scanner that saves images as a bit map, PICT or TIFF file. Comes with type tables that can be customized. Version 1.1. $395; ThunderScan version, $149.95. Olduvai Software, 7520 Red Road, South Miami, FL 33143. NCP (Apr '88)

RoundUp searches your disk for a specified text string. Slow, awkward, poor
★ performer. Does not work with Mac II or 68020 accelerators. Version 2.0E reviewed. Requires 512K. $49.95. Virginia System Software Services, 5509 West Bay Court, Midlothian, VA 23112. NCP (Mar '89)

Sentinel encrypts data files (or sets of files) using a super-secure DES or a super-
★★★★ fast SuperCrypt algorithm. Provides high-level security if you can keep your passwords secret. Requires 512KE. $295. SuperMac, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (Apr '88)

Smart Alarms is the best reminder system for the Mac. Easy to use, versatile, and,
★★★★½ well, smart. This self-running DA automatically reminds you of anything you enter into its Reminder file, giving you a wide range of useful advance warning options. $49.95. Imagine Software, 19 Bolinas Road, Fairfax, CA 94930. NCP (Oct '86)

SmartScrap and The Clipper are two useful desk accessory utilities for graphics
★★★★½ work. SmartScrap is a major enhancement to the standard Scrapbook DA. The Clipper provides you with a transparent Clipboard window, allowing you to resize or crop a graphic to the area that it will be pasted to. $59.95. Solutions International, 30 Commerce St., Williston, VT 05495. NCP (July '87) ★'87 Eddy

SoundWave is a useful sound recording and editing utility. Works with waveforms;
★★★★ able to change sampling rates. Previously known as SoundCap. $199.95. Impulse, 6870 Shingle Creek Parkway, Minneapolis, MN 55430. NCP (Apr '88)

Stepping Out II is a software alternative to a large-screen monitor. Lets you create
★★★★★ a virtual screen (as large as memory allows) inside the Mac's 9-inch screen. Automatically scrolls to new document position as you type or draw. Version 2.0. Requires 1 megabyte. $95. Berkeley System Design, 1700 Shattuck Ave., Berkeley, CA 94709. NCP (Oct '88)

StuffIt compresses files to reduce the amount of space they take up on disk. Great
★★★★★ for transferring documents via modem. Also joins and encrypts files. Version 1.5. Requires 512KE. Shareware fee, $18. Raymond Lau, 100-04 70 Ave., Forest Hills, NY 11375-5133; also available on most electronic services. NCP (Dec '88)

Suitcase is a transparent program that automatically lets you use all your fonts
★★★★★ and DAs. Foolproof and indispensible. Comes with Pyrol, the best screen saver. Requires 512K+. $59.95. Fifth Generation, 1322 Bell Ave., Tustin, CA 92680. NCP (Nov '87) ★'87 Eddy

SuperLaserSpool is a LaserWriter spooler. Very fast because it does conversion
★★★★ to PostScript in the background, but doesn't print a faithful rendition of PageMaker documents as a result. $149.95 single user, $395.95 for up to five users on one network. SuperMac Software, 950 N. Rengstorff Ave., Mountain View, CA 94043. NCP (June '87)

Switcher is Andy Hertzfeld's contribution to Mac productivity. This program lets
★★★★★ users run several programs at once (up to eight on a 1-megabyte or larger machine). Switching between the programs is nearly instantaneous. Requires 512K+. $19.95 from Apple, free from BBSs, included with some third-party applications. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (June '86)

Symantec Utilities for Macintosh (or SUM) reduces worries about losing data. It
★★★★★ prevents, diagnoses, and if required, fixes many serious disk and file problems. Recovers lost files on crashed hard disks. Version 1.0. Re-



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quires 512KE. $99.95. Symantec, 10201 Torre Ave., Cupertino, CA 95014. NCP (Sept '88)

Tempo II is a powerful keyboard macro program that gives owners of extended keyboards their money's worth. Especially good for building sequential macros. Features include conditional branching and the ability to remember menu selections by name. Version 1.0. $149.95. Affinity Microsystems, Ltd., 1050 Walnut St., Suite 425, Boulder, CO 80302. NCP (Dec '88)

Top Desk is a set of seven self-installing (and self-removing) DAs. Menu Key adds Command key sequences to programs; View allows looking at and moving data between up to eight MacWrite documents; also included are BackPrint, Touch 'n' Go, Blank, Encrypt, and Launch. $59.95. Cortland Computer, P.O. Box 9916, Berkeley, CA 94709. NCP (May '86) ★'86 Eddy

TMON is the debugger for the Mac. This isn't open to question. TMON is simply the best. Comes with the latest version of Darin Adler's Extended User Area. $149. ICOM Simulations, 626 Wheeling Road, Wheeling, IL 60090. NCP

Turbo Download is a desk accessory designed specifically to increase the speed of Xmodem data transfers from national databases to your Mac. Speed increases range upward from 50 percent to over 300 percent at 2400 baud. $39.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP

Twelve-C Financial Desk Accessory brings all the power and functionality of a Hewlett-Packard 12C programmable calculator to your desktop. Can be programmed and all registers can be viewed while calculator is running. $49.95. Positive Works, 142 Cone Road, Ormond Beach, FL 32074. NCP

TypeNow is a desk accessory that allows the Mac and ImageWriter to function as an electronic typewriter. Type can be placed into blanks in complex forms easily. Typing can be recorded and played back. $39.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (Jan '86)

WorksPlus Command lets you build and define macros for all Works modules. Predefined macros provide for an even tighter integration of the program's word-processing, spreadsheet, and database modules. Requires 1 megabyte +. $99.95. Lundeen & Associates, P.O. Box 30038, Oakland, CA 940604. NCP (May '88)

LANGUAGES

AAIS Prolog is a fast standard Prolog with excellent debugging and error handling. Good for serious program development. Documentation is not as good as the program. $150. Advanced AI Systems, P.O. Box 39-0360, Mountain View, CA 94039-0360. NCP (Mar '87)

Acknowledge lets advanced programmers create customized applications that will accomplish many telecommunications tasks — from automatically picking up E-mail to communicating with VAXs. Version 1.0. Requires 512KE. $495. SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (Jan '89)

Allegro Common LISP's development environment is a full EMACS style editor called FRED that implements most Common LISP editing and debugging functions. Version 1.2. Requires 1 megabyte and a hard drive. $600. Coral Software, P.O. Box 307, Cambridge, MA 02142. NCP (Nov '88)

Aztec C is a C language that will appeal to users with a UNIX background. It uses many UNIX conventions and in the more expensive versions comes with standard UNIX utilities, including the VI editor. $75 beginners, $199 basic system, $299 development system, $499 commercial system. Manx Software Systems, P.O. Box 55, Shrewsbury, NJ 07701. NCP (May '86)

Basic Compiler is the long-awaited compiler for Microsoft BASIC. The interface is unfriendly, but it gets the job done. Compiled programs run faster, but you can still tell they are written in BASIC. $195. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. NCP (May '87)

ExperCommon Lisp is a LISP development system. Not fully Common LISP compatible, but creates good compiled code and stand-alone applications. Requires 1 megabyte +. $995. ExperTelligence, 559 San Ysidro Road, Santa Barbara, CA 93108. NCP (Aug '87)

ExperLISP is a useful programming language for high-level programmers. The more you use it, the more you'll figure out about it. $495. Requires 512K+. ExperTelligence, 559 San Ysidro Road, Santa Barbara, CA 93108. CP

ExperLogo is a version of the popular teaching language, Logo. Features three-dimensional graphics using "bunnies" rather than the usual "turtles." Very speedy, smooth program. Comes with an excellent manual. $149.95. ExperTelligence, 559 San Ysidro Road, Santa Barbara, CA 93108. CP

ExperProlog II is a Prolog based on the new Prolog II standard. Has the ability to handle infinite trees and allows user-defined functions that operate conditionally. Documentation is not the best and Mac interface is nonstandard. $495. ExperTelligence, 559 San Ysidro Road, Santa Barbara, CA 93108. NCP (Mar '87)

LPA MacProlog is a much improved program that includes incremental and optimizing compilers, a graphics environment package, and C and Pascal submodules. Version 2.0. Requires 1 megabyte +. $495. Programming Logic Systems, 31 Crescent Drive, Milford, CT 06460. NCP (Feb '88)

Mac C is a good, highly Mac-oriented implementation of this popular development language. Assembler and linker included. $425. Consulair, 140 Campo Drive, Portola Valley, CA 94025. NCP ★'85 Eddy

MacExpress is a development environment or shell. Programmers use it to save time and effort when developing stand-alone applications for the Mac. $195. ALSoft, P.O. Box 927, Spring, TX 77383. NCP (Feb '86)

MacForth Plus is an excellent implementation of the popular Forth programming language. New, reduced price; $199. Creative Solutions, 4701 Randolph Road, Rockville, MD 20852. NCP

Mach II is a multitasking implementation of Forth that allows local variables and text files. Can create stand-alone applications. Several windows can be up with different operations in each, operating concurrently. Execution is fast. $99.95. Requires 512K+. Palo Alto Shipping, P.O. Box 7430, Menlo Park, CA 94026. NCP (Apr '86)

Macintosh 68000 Development System is a fairly traditional assembly language package. The two-disk set provides an editor (Edit), an assembler, a linker, an executive, and a resource compiler. $195. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP

Macintosh Pascal is Apple Computer's version of this very popular programming language. Loaded as it is with innovative teaching features, this interpreter is an excellent introduction to Pascal. $125. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. CP

MacScheme is a LISP dialect with "artificial intelligence" capabilities. Has a large appetite for RAM. Interpreted language with Toolbox access limited to a small part of QuickDraw. $125. Semantic Microsystems, 4470 S.W. Hall St., Beaverton, OR 97005. NCP (June '86)

MacScheme+Toolsmith is a Mac version of Scheme, a LISP dialect. Beautiful implementation, marred only by relative slowness compared to similar products. Get Toolsmith. Requires 1 megabyte +. $395. Semantic Microsystems, 4470 S.W. Hall, Beaverton, OR 97005. NCP (Aug '87)

Microsoft BASIC was the Mac's first programming language. This interpreter (it's not a compiler) now supports the Toolbox and the whole Mac interface can be implemented in your programs. For nonprogrammers, there are lots of programs available. $99. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. NCP ★'85 Eddy

MIDIBasic is a library of simple, but highly useful routines for writing MIDI software. Good stuff. Sketchy documentation. Works with both Microsoft and ZBasic. Requires 512K+ plus BASIC. $49.95. Altech Systems, 831 Kings Highway, Shreveport, LA 71119. NCP (Aug '87)

Object Logo is an object-oriented programming language with access to the Toolbox. Good product, but can't produce stand-alone applications. Requires 512K+. $79.95. Coral Software, P.O. Box 307, Cambridge, MA 02142. NCP (Aug '87)

Personal Prolog is an inexpensive and well-documented program. Has no debugging or search and replace facilities, making it a more appropriate tool for learning than development. Documentation and use of Mac interface are excellent. $64.95. Optimized Systems Software, 1221 B Kentwood Ave., San Jose, CA 95129. NCP (Mar '87)

Prolog/m is a solid Prolog following the Edinburgh standard. Has extensive debugging facilities, but you'll need a separate Toolbox disk with 58 additional predicates. Drawback: No true editing or printing facilities. $99.95. Chalcedony Software, 5580 La Jolla Blvd., La Jolla, CA 92037. NCP (Mar '87)

QUED (Quality Editor for Developers) is the ultimate source code editor. Loaded with useful and well-thought-out features, it will make any programmer's life much easier. It is not a word processor, however. $65. Paragon Concepts, 4954 Sun Valley Road, Del Mar, CA 92014. NCP (Mar '86)

THINK's Lightspeed C features rapid turnaround time for development and testing of programs by the use of an integrated compiler, linker, and editor. Source-level debugger steps through your code line by line to examine the values of variables. Version 3.0. Requires 2 megabytes RAM. $175. Symantec, 10201 Torre Ave., Cupertino, CA 95014. NCP (Jan '89)

THINK's Lightspeed Pascal is a fast, powerful development system for Pascal programming. Fully integrated Mac-like environment. Requires 512K+. $125. Symantec, 10201 Torre Ave., Cupertino, CA 95014. NCP (Feb '87)

TML Data Base Toolkit is an ISAM-type database that provides fast and efficient administration of large data files in applications developed with TML compiler. Supports multiple open index files. $89.95. TML Systems, 4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (Dec '86)

TML (MacLanguage Series) Pascal is a good Pascal compiler, capable of producing stand-alone programs. Can use most existing Lisa Pascal programs with only slight modification. Requires 512K+. $99.95. TML Systems, 4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (June '86) ★'86 Eddy

TML Source Code Library shows how to write programs that use custom definition routines, speech, serial drivers, split bars, and other topics. Provided on three 400K diskettes. Requires TML Pascal. $79.95. TML Systems, 4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (Dec '86)

Visual Interactive Programming is a unique visual programming system for creating simple Macintosh applications. Programs are constructed in a flowchart-type manner. Easy access to most toolbox routines. $149.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (June '87)

MINIFINDERS



ZBasic is a fast, interactive compiler capable of creating stand-alone applications
★★★★ that take advantage of Mac's unique features and abilities. Includes Edit, RMaker and MacInTalk. Requires 512K+. $89.95. Zedcor, 4500 E. Speedway Blvd., Tucson, AZ 85712. NCP (Dec '86)

EDUCATION

Alphabet Blocks teaches prereaders the letters and sounds of the alphabet. The
★★★★★ digitized voice of an on-screen elf is clear and pleasant. Very intuitive. Requires 1 megabyte +. $59.95. Bright Star Technology, 14450 N.E. 29th Place, Bellevue, WA 98007. NCP (May '88)

American Discovery is an interactive United States geography game that teaches
★★★ states, capitals, and, in a roundabout manner, postal codes. Suffers from small maps. Requires 512K+. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (May '88)

Business Simulator is a training tool in a simulation game. Make decisions that
★★★★ manage the company through several stages over 25 years. Decisions become more difficult over time. Requires 1 megabyte +, two disk drives (one must be 800K). May be run from a hard disk. $69.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. NCP (Dec '87)

ChipWits is a combination game and teaching tool. Players create programs to
★★★½ maneuver robots through a set of eight mazes. The programs are written in ChipWit's built-in icon-based programming language (IBOL). $49.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP ★'85 Eddy

Course Builder creates stand-alone educational applications. An easy-to-learn
★★★★ dedicated programming language uses blocks and arrows. Graphics, animation and sound can be integrated. Version 2.0 allows mathematical calculations. Poor documentation. $395, plus $10 shipping. Tele-Robotics International, 8410 Oak Ridge Highway, Knoxville, TN 37931. NCP (Oct '87)

KidsTime is a package of five quality educational programs for children between
★★★★ the ages of 3 and 12. The programs all have adjustable difficulty levels. Some use speech and one is a nice introduction to musical notes. Sparse documentation. $49.95. Great Wave, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Oct '86) ★'86 Eddy

LearnWord 3.0 is a three-part series of cassette tape/diskette modules that
★★★½ explain the intricacies of Word 3.0. They do the job, but remind you why cutting classes was more fun. $49.95 per module. Personal Training Systems, P.O. Box 54240, San Jose, CA 95154. (Apr '88)

LXR•Test generates tests from a database of questions. Makes it easy to modify
★★★★ and scramble test questions. Flexible output. Requires Mac 512KE+, two 800K drives, or a hard-disk drive. $199 or $399, depending on features. Logic eXtension Resources, 9651 Business Center Drive, Rancho Cucamonga, CA 91730. NCP (May '88)

MacType offers structured typing instruction. Can teach both standard and Dvorak
★★★★ keyboards. Features include certificates for reaching certain levels. Can be used in a multistudent environment. $49.95. Palantir Software, 12777 Jones Road, Houston, TX 77070. CP

MasterType is proof that learning to type can be fun. In this arcade-style action
★★★ game words descend from four corners towards the center ship; the user must type them correctly. Features 18 skill levels, tracks errors, recommends lessons and provides comparison scores. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP

Mavis Beacon Teaches Typing! has more features than a Selectric. Lots of
★★★★ diagnostics concerning typos. Incomplete docs. Version 1.1. Requires 1 megabyte. $49.95. Software Toolworks, 1 Toolworks Plaza, 13557 Ventura Blvd., Sherman Oaks, CA 91423. CP (Nov '88)

On Becoming a Desktop Publisher is a video training tape based largely on the
★★★★ syndicated television program, "The Computer show." Good primer on the fundamentals of DTP products. Will eventually become dated. Requires Beta or VHS VCR. $49.95. Ocean Communications, 1641 North First St., Suite 160, San Jose, CA 95112. (Sept '88)

Reader Rabbit teaches 4-to-8-year olds how to read in four elegant games that
★★★★★ play and build off of each other. Requires 512KE+ and an 800K drive. Mac II and MultiFinder hostile. Version 2.0 reviewed. $59.95. The Learning Company, 6493 Kaiser Drive, Fremont, CA 94555. CP (June '88)

Sensei Physics is a capable, intelligent, well-designed study aid. Covers Vectors
★★★★½ to Thermodynamics to The Nature of Light. Animated experiments let you try out concepts. Requires 512K+. $99.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903. CP (Jan '88)

Type! is a typing tutorial that is both practical and flashy. It allows users to interrupt
★★★★½ and move easily between functions; however, use of the Return key or space bar are assumed but never explained. Version 1.0. Requires 512K. $29.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903-2101. NCP (Nov '88)

Typing Instructor Encore recognizes that it's being used on a word processor.
★★★★ While it is easy to control, there are some strange bugs in the program. Requires 512K. $49.95. INDIVIDUAL Software, 125 Shoreway Road, Suite 3000, San Carlos, CA 94070-2704. NCP (Nov '88)

Typing Tutor IV consistently tests your use of all keys, including seldom-used
★★★ ones. It's hard to maintain user's attention span, as the testing material is unimaginative. Requires 512K. $49.95. Simon & Schuster, One Gulf and Western Plaza, New York, NY 10023. NCP (Nov '88)

ENTERTAINMENT

A Mind Forever Voyaging is a departure in text adventure games. It has a more
★★★ extensive vocabulary and a more involved story than most of the genre. The story here is gripping, but there are only a few puzzles to solve. Requires 512K+. $39.95. Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140. NCP (Apr '86)

The Ancient Art of War gives users a chance to refight some famous campaigns
★★★★½ on both strategic and tactical levels. Campaigns can also be designed from scratch. Very playable, addicting game. Requires 512K+ Mac. $44.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903. CP (Apr '86)

Balance of Power is the world's first computer peace game. This simulation
★★★★★ allows players to become either the President of the United States or General Secretary of the Soviet Union. Extraordinary artificial intelligence routines and general play make this a classic. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60022. CP (Prem)

Battle Stations is a deceptively simple game based on the pen and paper game of
★★★★ Battleship. Requires strategy on several levels. Makes excellent use of Mac sound and graphics. Fun, casual game, especially when the Mac is one of the players. Requires 512K+. $30. Timeline, P.O. Box 60, Ypsilanti, MI 48197. NCP (June '87)

Beyond Dark Castle brings back Prince Duncan in an encore performance to run,
★★★½ jump, and beat his way to victory. But really, just more of the same. Requires 512KE. $49.95, Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126. NCP (Aug '88)

Beyond Zork is yet another installment in the famous Zork series of text adven-
★★★★½ tures. Find the fabled Coconut of Quendor to restore failing magic in this expert-level game. On-screen mapping and the Mac's window environment are utilized. $49.95. Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140. NCP (Apr '88)

The Chessmaster 2000 is a masterful chess program that will appeal to both
★★★★★ novice and master. You can view the board from 2-D or 3-D perspective and turn the board for a better look. Play is smooth and easy, and the program responds by voice. You may get tired of hearing "Gotcha," though. $39.95. The Software Toolworks, 13557 Ventura Blvd., Sherman Oaks, CA 91423. CP (July '87)

Crystal Quest combines all the good elements of nearly every video game ever
★★★★★ made. Move a piece around to gobble up points and crystals. Shoot the nasties and get through the goal before they get you. Excellent sound effects. In color on the Mac II. Requires 512K. $49.95. Casady and Greene, P.O. Box 223779, Carmel, CA 93922. NCP (Apr '88)

Dark Castle is an outstanding achievement in action games which integrates
★★★★★ RealSound with superb animation and graphics. You'll need better-than-average hand/eye coordination, but it's well worth the effort. Requires 512K+. $39.95. Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126. NCP (Apr '87) ★'87 Eddy

Deja Vu: A Nightmare Comes True is a graphic adventure that breaks new
★★★★★ ground. Innovative use of the Mac interface in a truly playable and exciting game. A great introduction to graphic adventure games. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP (Jan '86) ★'85 Eddy

Dinner at Eight is a useful recipe-filing system that includes a collection of recipes
★★★★ from a nationwide sampling of restaurants. Users enter number of diners and program scales recipes. $49.95. Rubicon, 2111 Dickson Drive, Austin, TX 78704. NCP (Jan '86)

Down Hill Racer is an action game with three skier personalities, four courses and
★★★★ four skill levels. There's something here for every player, no matter how bad or good. Full digitized sound (very nice!). $49.95. Miles Computing, 7741 Alabama Ave., Canoga Park, CA 91304. CP (Sept '87)

Falcon simulates an F-16 fighter jet with gut-tightening, sweat-making realism.
★★★★½ Go against MiGs and dodge SAMs scenarios. Requires 1 megabyte +. $49.95. Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501. NCP (May '88)

Ferrari Grand Prix is an exciting race car simulation game. Mastering it takes quite
★★★★ a bit of time and effort. Startup course and four other courses are built into the program. You can also design your own courses and backgrounds. Requires 512K+. $59.95. Bullseye Software, P.O. Drawer 7900, Incline Village, NV 89450. CP (July '87)

Fool's Errand is an outstanding collection of 80 puzzles woven around a mythical
★★★★★ theme of an evil priestess and the search for wisdom. Requires 512K+. $49.95. Miles Computing, 7741 Alabama Ave., Canoga Park, CA 91304. NCP (July '88)

Gato puts players in command of an American submarine in World War II. This
★★★★½ superb simulation game uses all of the Mac's graphic capabilities to really make you feel that "you are there." $49.95. Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501. CP (Nov '85)

ON APRIL 17, WE'RE GIVING AWAY THE MOST SOUGHT AFTER HARDWARE IN THE INDUSTRY.

See our May issue to find out which new Macintosh products won the Eddys—the industry's most prestigious award. Ceremonies will be held April 17th in New York. Read all about it in our special issue. It could be a very rewarding experience.

MacUser



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MINIFINDERS



GO is the Chinese equivalent of chess. Players plonk markers on a grid to gain
★★★½ territory and outwit an opponent or the computer. Requires 512K+. Mac II hostile; MultiFinder friendly. Version 1.0 reviewed. $49.95. Infinity Software, 1144 65th St., Studio C, Emeryville, CA 94608. NCP (June '88)

Handwriting Analyst produces a personality profile based on answers to ques-
★★★★½ tions about one's handwriting. It's simple and the results will amaze and astound. $49.95. Ciasa, 2017 Cedar St., Berkeley, CA 94709. NCP (Apr '88)

Hollywood Hijinx substitutes a modern Hollywood estate for the famous Under-
★★★★ ground Empire, but otherwise represents a return to Zork gameplay and feel. There's even a maze to navigate. Simplistic, but good. $39.95. Infocom, 15 Cambridge Park Drive, Cambridge, MA 02140. NCP (June '87)

Klondike is a version of solitaire that uses video game-like scoring to create a
★★★★★ superb, totally addictive game. Simple to play, nearly impossible to stop playing. Version 3.3. Shareware: $10. Unison Software, 415 Clyde Ave., Mountain View, CA 94043. NCP (Dec '87)

Leather Goddesses of Phobos is another in the long line of witty and entertaining
★★★★★ Infocom text adventures. This one lets you choose your sex and comes with a 3-D comic and a scratch 'n' sniff card. It has three levels of play: tame, suggestive and lewd. $19.95. Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140. NCP (Feb '87)

Lunar Rescue puts you in the role of a benevolent trader ready to save a moon
★★★★½ colony from invasion. Blast the enemy while you travel from town to town trading goods for the supplies you need for your mission. Version 1.0. Requires 512KE. $59.95. Practical Computer Applications, 1305 Jefferson Highway, Champlin, MN 55316. CP (Jan '89)

MacGolf is a dynamic simulation of real golf. Players have a choice of courses and
★★★★½ difficulty levels. Superb playability makes this a must for all golfers and gamers. Requires 512K+. $59.95. Practical Computer Applications, 1305 Jefferson Highway, Champlin, MN 55316. CP (May '86)

Mac Pro Football is a terrific sports simulation that gives you the chance to pit any
★★★★ combination of 38 Super Bowl teams against each other and direct team play. It comes with excellent, detailed (and necessary) documentation. Play selection can get a bit Byzantine. $49.95. Avalon Hill, 4517 Harford Road, Baltimore, MD 21214. CP (Mar '87)

MacRacquetball uses digitized videos and sounds of professional players for a
★★★½ realistic simulation. Has lots of control settings and can be played against someone else over a modem or between hard-wired Macs. Turn off hard disks before playing. $59.95. Practical Computer Applications, 1305 Jefferson Highway, Champlin, MN 55316. CP (Oct '87)

MoonMist is an introductory level text adventure game. This is a typical haunted
★★★ English castle story, not quite up to Infocom's best. It has four versions, so it's good for more than one play. $39.95. Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140. NCP (May '87)

MSFL: Pro League Football is a professional football league simulation that
★★★★½ encourages people to play people, not the machine. Fast with lots of stats. Quirky MS-BASIC behavior. Spotty manual. No LaserWriter support. Requires 1 megabyte +. $49. MicroSports, P.O. Box 15799, Chattanooga, TN 37415. NCP (Apr '88)

NewGammon is animated backgammon that will challenge even good players. Fea-
★★★★ tures include variable skill levels and strategies and options to play the Mac or watch the Mac play itself. An arcade-like high-speed mode is included. $39.95. Newsoft, P.O. Box 3046, Newport Beach, CA 92663. CP

NFL Challenge simulates coaching and watching professional football. Comes on
★★★½ two disks, one with program and System, the other with statistical data. Play against either human or computer coaching. Plays are selected from pre-defined playbooks. $99.95. XOR Corp., 5421 Opportunity Court, Minnetonka, MN 55343. NCP (June '87)

Ogre is a strategy tank game played on a hexagon grid. The ogre is an intelligent
★★★★ cybertank out to smash your command post. Customize your defense. Exceptionally good Mac interface. Has two-player option. $30. Origin Systems, 136 Harvey Road, Building B, Londonderry, NH 03053. CP (Nov '87)

Patton vs. Rommel is a traditional-style strategic war game. It covers events in
★★★★ Normandy in 1944. While complex, it's well-designed and very playable. $39.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. CP (Apr '87)

Pinball Construction Set lets users create their own pinball games, as elaborate
★★★★ or as easy as desired. Uses MacPaint for backgrounds and has lifelike sounds (on 512K+ Macs). $39.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. CP (Jan '86)

Puppy Love is a combined game and teaching tool. As you teach your puppy tricks
★★★★½ and routines, you learn the basics of programming logic. Great fun for all ages. Does not run from a hard disk. $29.95. Addison-Wesley, Route 128, Reading, MA 01867. CP (Mar '87)

Quarterstaff is a fantasy adventure game of the typical "good versus evil" variety.
★★★★ Ability to use characters in other adventures gives this game a lot of potential for development. Version 1.2. Requires 1 megabyte +. $49.95. Simulated Environment Systems, 800 South Pacific Coast Highway, Redondo Beach, CA 90277. NCP (Mar '88)

Seven Cities of Gold is an educational program masquerading as an adventure
★★★★ game and is practically unique in being equally good in both respects. You are to land (not the easiest part) in the New World and attempt to placate the natives, seed a few missions and collect gold. Nice work if you can get it. $39.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. CP (June '87)

Shadowgate is an icon-based graphic adventure. You, as the seed of prophecy,
★★★★½ must save the world from the evil warlock. Far surpasses all others with great animated graphics, sound, and adventure. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP (Dec '87)

Shanghai challenges players to clear a board of all 144 tiles by matching pairs of
★★★★★ mah-jongg tiles and removing them. Terrific strategic options plus the ability to randomly generate new game boards keep this one fresh. $44.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. CP (Nov '86) ★'86 Eddy

Snake-Bar lets you guide a snake (or train or semi) through a maze, picking up
★★★★ objects that feed and make your snake grow. Options include changing languages, editing the maze, and an X-rated game. $15 (shareware). Georges Malmound, 37 Bis rue des Abbesses, Montmartre, 75018 Paris, France. NCP (Dec '87)

Solitaire Royale is a collection of eight solitaire card games. The Tour mode cycles
★★★★ through each game. Tournament deals the same hand for several players. $34.95. Published by Spectrum Holobyte, 2061 Challenger Drive, Alameda CA 94501. CP (May '88)

Space Quest is a three-dimensional, animated adventure in which you play a
★★★★ janitor in a dicey situation. All you have to do is get off your ship before it explodes and save the Earnon System. Runs on any Mac. $49.95. Sierra On-Line, P.O. Box 485, Coarsegold, CA 93614. CP (Sept '87)

Star Fleet I: The War Begins! is a space opera of the Star Trek variety. Rise
★★★★ through the ranks from ensign to admiral in this serialized adventure. Requires 512K+. $55. Interstel, P.O. Box 57825, Webster, TX 77598. NCP (May '88)

Strategic Conquest Plus challenges you to discover an unexplored world and
★★★★½ conquer it by manufacturing and deploying armies, ships, and planes. A two-disk game that doesn't support an external drive. Requires 512K+. $59.95. PBI Software, 1111 Triton Drive, Foster City, CA 94404. CP (Feb '88)

Sub Battle Simulator is a superior naval combat game. Sixty different missions
★★★★ and the ability to link missions keep it from ever getting boring. Requires 512K+. $39.95. Epyx, P.O. Box 8020, Redwood City, CA 94063. NCP (Aug '87)

Trust & Betrayal: The Legacy of Siboot requires negotiating with six artificial
★★★★½ personalities in a struggle for power — not surprising considering that it comes from the maker of Balance of Power. Uses hieroglyphics to communicate in a fantasy world. Requires 512K+. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP (Mar '88)

Ultima III allows up to four characters cooperate to explore the vast wilderness of
★★★★½ Sosaria. $59.95. Origin Systems, 340 Harvey Road, Manchester, NH 03103. CP

Uninvited is an icon-based adventure game set in an extremely haunted mansion.
★★★★★ Graphic interface makes it easy to play. Animation and sound add to the thrill. $49.95. Mindscape, 3444 Dundee, Northbrook, IL 60062. CP (Sept '86) ★'86 Eddy

Winter Games lets up to eight players compete against each other in Olympic
★★★★ events including figure skating, bob sledding, biathlon, and ski-jumping. Excellent animation, good graphics, good theme music. $39.95. Epyx, 600 Galveston Drive, P.O. Box 8020, Redwood City, CA 94063. CP (Mar '86)

Wizardry is an outstanding dungeon exploration adventure pitting a party of up to
★★★★★ six characters against the guardian monsters of the evil wizard Werdna. Capture his amulet to earn your reward. Even after solving the game, you'll want to go back into the dungeon. $59.95. Sir-Tech, Charlestown-Ogdensburg Mall, P.O. Box 245, Ogdensburg, NY 13669. CP

Your Personal Poet creates personalized greeting cards on the Mac. Comes
★★★½ complete with four greeting cards and matching envelopes. Requires 512K+. $29.95. Computer Poet, 775 E. Greg St., Sparks, NV 89431. NCP (June '87)

MUSIC

Alchemy loads and edits digitally sampled sounds from most commercial sam-
★★★★★ plers. Works with 512K, but it eats up memory quickly. Requires MIDI or RS-422 interface, and sampler. $495. Blank Software, 1477 Folsom St., San Francisco, CA 94103. CP (Oct '88)

Apple MIDI Interface is a simple Musical Instrument Digital Interface with a 1
★★★ megahertz clock rate. Has only one MIDI input and one output. Works with all Macs; adapter required for 128K and 512K. $99. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (June '88)

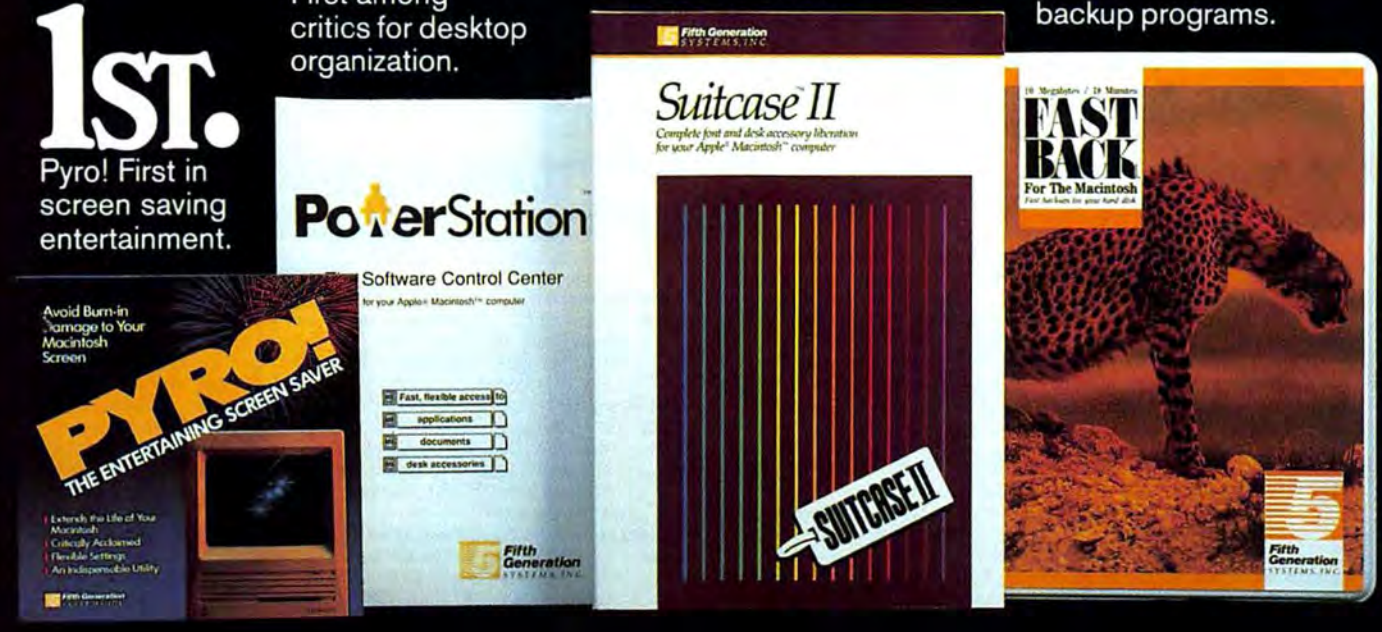
ConcertWare+ is an enhanced version of ConcertWare. Has different instru-
★★★★ ments and can use any four of a set of eight at any point in a piece. Supports Adobe Sonata music font. $69.95. Great Wave Software, 5353

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MINIFINDERS



Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Dec '87) ★'85 Eddy

ConcertWare+MIDI is a composition and transcription program that can record ♦♦♦♦ multiple notes from a MIDI keyboard. Easy to use if you read music. Handles eight tracks of eight voices each. Requires 512K. Version 4.0. $149.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Dec '87)

Cue: The Film Music System is a powerful and versatile assistant for scoring ♦♦♦♦½ films. Automates spotting and logging cue points and searching for matching tempos. Also performs many minor jobs, such as generating a performing rights cue sheet. Version 2.0 reviewed. Requires 512KE. $595. Opcode Systems, 1024 Hamilton Court, Menlo Park, CA 94025. CP (Feb '89)

Deluxe Music Construction Set lets you enter up to 48 voices on eight staves, ♦♦♦♦ and play the music through the Mac's internal speaker and/or via MIDI. Requires 512K+. Mac II and MultiFinder hostile. Version 2.0 reviewed. $99.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. CP (June '88)

Graphic Notes Music Publisher is a very good page-layout program for music ♦♦♦♦ notation, with MIDI support. Comes with special musical notation keypad. Version 2.0 reviewed. Requires 1 megabyte and second disk drive. $595 (including Presto keypad). Graphic Notes Inc., 200 Seventh Ave., Santa Cruz, CA 95062. NCP (Mar '89)

Jam Factory is a program for performing complex manipulations on MIDI data in ♦♦♦ real time. Unique, entertaining, and very powerful, but requires lots of patience and practice. Requires 512K+, MIDI interface, and MIDI synthesizer. $189. Intelligent Computer Music Systems, P.O. Box 8748, Albany, NY 12208. CP (Oct '87)

Jam Session is a music program for those who think MIDI refers to the length of ♦♦♦♦ skirts. Without any skill, you can "Jam" with rock, jazz, rap, or country tunes. A sort of "Sing Along With Mitch" for the computer set. Requires 512K+. $49.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903. CP (July '88)

Listen is an educational tool for ear training. It has both a piano keyboard and a ♦♦♦♦ guitar fretboard for the student to input notes, and offers a wide range of exercises. $99. Resonate, P.O. Box 996, Menlo Park, CA 94026. (Jan '87)

M is a music composition and creation program that works with MIDI data in real ♦♦♦ time. Unique, entertaining, and very powerful, but requires lots of patience and practice. Requires 512K+, MIDI interface, and MIDI synthesizer. $219. Intelligent Computer Music Systems, P.O. Box 8748, Albany, NY 12208. CP (Oct '87)

Master Tracks Pro is a full-featured, second-generation MIDI sequencer that ♦♦♦♦½ adheres to the Mac interface very well. It's the first program to have graphic-controller editing. Needs patch chasing for professional use, but it's still a rock-solid program. $350. Passport Designs, 625 Miramontes St., #103, Half Moon Bay, CA 94019. CP (Dec '87)

MIDIBasic is a simple, but highly useful routine for writing MIDI software. Good ♦♦♦♦ stuff. Sketchy documentation. Works with both Microsoft and ZBasic. Requires 512K+ plus Basic. $49.95. Altech Systems, 831 Kings Highway, Shreveport, LA 71119. NCP (Aug '87)

Music Mouse is a music program in a genre all its own. Called an "intelligent ♦♦♦♦♦ instrument," Music Mouse gives you instant musical feedback as you move the mouse and type on the keyboard, which controls tempo, vibrato, volume, etc. $59.95. OpCode Systems, 444 Ramona St., Palo Alto, CA 94301. NCP (May '87)

Performer is the definitive MIDI sequencer, and is priced accordingly. Includes ♦♦♦♦ looping, SMPTE synching, 32 simultaneous Ins and Outs, unlimited overdubbing, and compatibility with Professional Composer for transription. Version 2.2. Requires MIDI interface and 512K+. $395. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. CP (Jan '88)

Practica Musica uses an interactive game and practice approach to teach music ♦♦♦♦ theory and ear training. Excellent training tool for the serious music student, it is also fun for anyone who wants to develop a trained ear for intervals, chords, and melodies. Requires 512K+. $125. ARS Nova Software, P.O. Box 40629, Santa Barbara, CA 93140. NCP (Nov '87) ★'87 Eddy

Professional Composer produces performance-quality sheet music using Ado- ♦♦♦½ be's Sonata font. Scores can be created from scratch or imported from Performer (and can be exported to Performer for MIDI playback). Requires 512K+. $495. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. CP (Jan '88)

Softsynth creates sounds for additive synthesis samplers. Downloading from Mac ♦♦♦♦ to sampler is time consuming. Requires 512K, sampler, MIDI interface. $295. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. CP (Oct '88)

Sound Designer set the standard for editing samples on lower-cost samplers, but ♦♦♦♦ it still lacks real-time high-fidelity playback. Requires 512K, sampler, MIDI interface. Emax, E II, 2000/2002, DSS-1, S900,$495; all others, $395. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. CP (Oct '88)

Studio Session consists of two programs, an Editor, and a Player, that produce ♦♦♦♦½ music with six voices of digitized sound. Excellent program plus good manual make this a good buy. $89.95. Bogas Productions, P.O. Box 6699, Terra Lina, CA 94903-0699. NCP (Aug '87) ★'86 Eddy

Turbosynth creates sounds for a digital sampler using modular synthesis tech- ♦♦♦♦♦ niques. Good harmonic spectral inverter. Lacks an easy method of multisampling. Requires 1 megabyte, sampler, MIDI interface. $349. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. CP (Oct '88)

UpBeat turns the Macintosh into a front panel for a highly complex and versatile ♦♦♦½ drum machine. Input patterns with mouse, MIDI keyboard, or drum machine. Requires 512K. $150. Intelligent Music, P.O. Box 8748, Albany, NY 12208. CP (May '88)

HARDWARE & ACCESSORIES

AppleCD SC reads CD-ROM optical discs that contain up to 656 megabytes of ♦♦♦♦ data. Also plays audio compact discs. Reads High Sierra format, an industry standard for CD-ROM. Requires SCSI port. $1,295. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (Dec '88)

Apple Scanner is not the state of the art, but is adequate for scanner neophytes. ♦♦♦½ The 4-bit (16 gray levels) scanner comes with AppleScan software and HyperScan, written by Bill Atkinson. Requires System 6.0; hard disk for full-page work; SCSI connection cables. $1,799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (Feb '89)

AST TurboScan is a 300 dpi scanner with sophisticated graphics software. Scans ♦♦♦♦ at resolutions from 72 to 300 dpi. Super-Scan software offers halftone, line art, and mixed modes. "Virtual memory processing" lets you scan images too large to fit in RAM. $1,899. Requires 512K+. SuperScan software included. AST Research, 2121 Alton Ave., Irvine, CA 92714. NCP (Nov '87)

Classic Professional Graphics Display is a low-cost color monitor for the Mac II. ♦♦♦½ Good value, but has an IBM-look about it. Green tint is annoying. Requires Apple video card. $549. Classic Components, 1490 Artesia Blvd., Gardena, CA 90247 (June '88)

CMS S-140 SCSI Hard Disk is a very fast, high-capacity SCSI hard disk with a ♦♦♦♦♦ unity interleave and average access time of 18 milliseconds. Holds 140 megabytes. Help, file transfer, and tape back-up commands built-in. Hard Disk Partition is a useful DA. Comes with a 6-foot SCSI cable. $2,995. CMS Enhancements, 1372 Valencia Ave., Tustin, CA 92680. (July '87)

ColorVue SE is a video processor board for the Mac SE that lets you display 16 ♦♦♦ colors on an exernal RGB monitor. Slows up performance. $695. Orchid Technology, 45365 Northport Loop West, Fremont, CA 94538. (Oct '88)

DASCH is an external RAM disk available in ½-, 1-, and 2-megabyte sizes. Con- ♦♦♦ nects to a serial port. Speeds up operations 200 to 300 percent. Can be used as a printer buffer. Works with all Macs. 512K, $395; 1M, $450; 2M, $545. Western Automation Laboratories, P.O. Box 3438, Boulder, CO 80307. (Feb '87)

DATA•PAK is a 45-megabyte removable Winchester hard disk. Great for backing ♦♦♦♦ up your main hard disk or transporting large amounts of data between office and home. Requires SCSI connector and System 4.1/5.5 or later. Drive, $1,799.95; cartridges, $149.95 each or tri-pack for $419.95. MASS MICRO Systems, Inc., 550 Del Rey Ave., Sunnyvale, CA 94086-3258. (Jan '89)

DaynaFile hooks up to a SCSI drive to read MS-DOS disks in the Mac environment. ♦♦♦♦ Use Mac applications to manipulate data created with an IBM PC. Comes in both 5.25 and 3.5 inch formats. $595 for single floppy. Dayna Communications, 50 S. Main St., Fifth Floor, Salt Lake City, UT 84144. (Jan '88) ★'87 Eddy

DEST PC Scan 2000 is an 8-bit scanner that saves images in up to 256 levels of ♦♦♦♦½ gray. Can be configured for IBM PCs. Requires 1 megabyte. Scanner, $1,495; Publish Pac software, $595; OCR text processor card, $995. DEST Corporation, 1201 Cadillac Court, Milpitas, CA 95035. NCP (Dec '88)

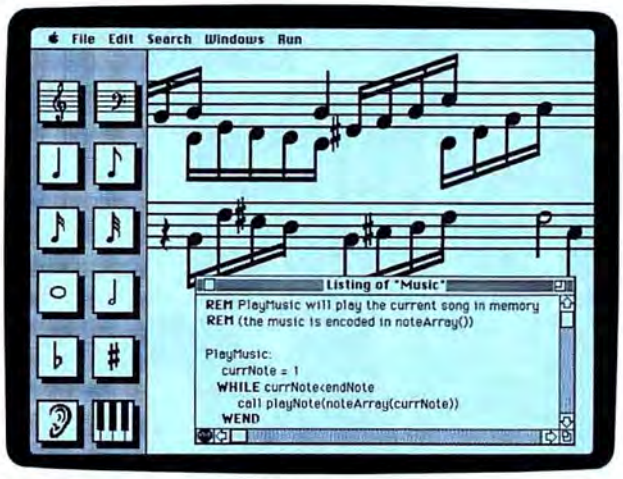
FAXstf is an early entrant in the fax modem race. Adequate, but slower than most ♦♦♦ fax machines, and using it as a normal modem requires changing plugs. Requires 1 megabyte of memory, and a hard disk is strongly recommended. $695. STF Technologies, P.O. Box 247, Higginsville, MO 64037. NCP (Feb '89)

Fellx is an optical-tracking graphics tablet that replaces a mouse. Precision mode ♦♦♦♦ gives pixel-by-pixel control. Doesn't collect dirt like a mouse does. The 6-inch square device is designed primarily for right-handed people. Works with Mac Plus. $149. Lightgate, 6202 Christie Ave., Emeryville, CA 94608. (Sept '88)

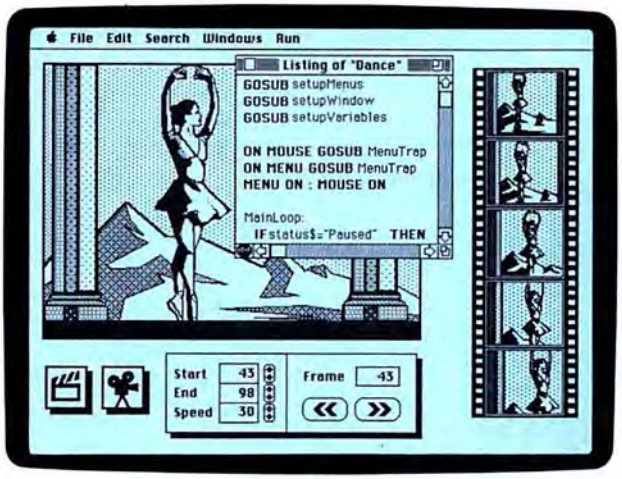
FX-20 is a good 20-megabyte external hard drive. Good utility software. Reliable ♦♦♦♦ and reasonably quiet. Sits next to the Mac, has a large, oddly-shaped case. Requires SCSI port, 512K+, new ROM. $1199. General Computer, 215 First St., Cambridge, MA 02142. (Feb '87)

Grappler LQ hooks Macs up to parallel laser and 24-pin letter-quality printers. A ♦♦♦♦ cable, driver software, and special fonts combine to make dozens of once-unfriendly printers now compatible with the Mac. Requires 1 mega-

Teach your Mac to perform unnatural acts.



It can sing.

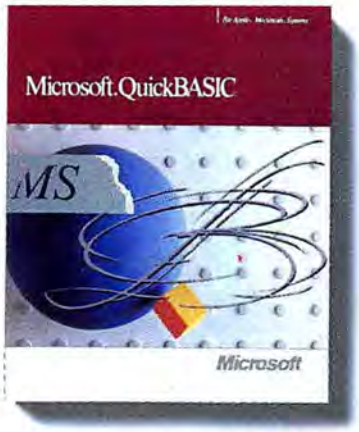


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If you're losing your passion for running the same old programs on your Mac,® add a little excitement to the relationship. Start writing your own, with the new Microsoft® QuickBASIC for the Macintosh.®



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BASIC is already the easiest language to learn on the Mac. And now, with new Microsoft QuickBASIC, it's even easier.

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If you helped triumph over the forces that be, and persuaded your company to purchase Macintosh Personal Computers, we want to hear your story.

You're what we call a "Macintosh Champion."™ And the fact that you directly influence purchasing could directly influence us to give you a fully-configured Macintosh II. Use the form on the right to tell your story. Then send it in before April 15, 1989.

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THE "HOW I CHAMPIONED THE MAC IN MY COMPANY" CONTEST QUESTIONNAIRE.

1. Are you personally involved in your company's decisions to buy Mac products or services? Do you help to SPECIFY BRANDS, RECOMMEND products, or SELECT the hardware, software and services your company uses with Macintosh computers? Yes ( ) No ( )

2a. How many Macintosh computers are currently installed in your company/department?

_____ *company* _____ *department*

2b. How many Macintosh computers did your company/department buy through your direct influence?

_____ *company* _____ *department*

2c. How many Macintosh software packages did your company/department buy through your direct influence?

_____ *company* _____ *department*

2d. How many Macintosh peripherals (printers, modems, etc.) did your company/department buy through your direct influence? _____ *company* _____ *department*

3. What is your job title? Please be as specific as possible. _____

4. Do you work in your company's MIS or DP department? *Yes* ( ) *No* ( )
If you answered "No," which department do you work in?

Sales/Customer Support	( )	Micro Information Center	( )
Engineering	( )	Purchasing	( )
Research and Development	( )	General Management/Administration	( )
Manufacturing/Production	( )	Personnel/Labor Relations	( )
Accounting/Finance/Auditing	( )	Other department (please specify)	( ) _____

5. What is your company's primary business? Please check the appropriate box or fill in the blank if you check "Other."

Government (includes federal, state, and local agencies)	( )	
Military (not a private contractor or supplier)	( )	
Education (public or private)	( )	
Transportation	( )	
Finance/Banking/Insurance/Real Estate	( )	
Manufacturing	( )	
Retailer/Distributor	( )	
Health/Medical/Legal Service	( )	
Agriculture/Construction/Mining/Oil/Utilities	( )	
Other	( )	*please be as specific as possible* _____

6. How many employees work in your entire company, including all divisions, departments and subsidiaries? _____

7. Please give us an example of how you have influenced or championed Macintosh product sales within your department or company. Please keep your story to 250 words or less. *THIS ESSAY MUST BE TYPED OR COMPUTER PRINTED ON 8.5 x 11 PAPER.*

RULES AND REGULATIONS:
1. ONLY THE FIRST 2,000 RESPONSES WILL BE ELIGIBLE TO WIN. 2. Stories must be no more than 250 words long and must be typed and double-spaced. 3. Only one entry per person is allowed. 4. Winner will be determined by June 15, 1989 and will be notified within 5 working days. The winner will be selected by a panel of MacUser marketing and editorial management. Judges' decision will be final. 5. The contest is open to all residents of the U.S. and its territories, who are 18 years of age or older, with the exception of employees of Ziff-Davis Publishing Company, its affiliates, its advertising and promotion agencies, and employee families. Void where prohibited or restricted by law. 6. For the name of the winner, please send a self addressed, stamped envelope to: The MAC II Contest, MacUser Magazine, 950 Tower Lane, 18th Floor, Foster City, CA 94404. Notification will be mailed within 60 days of the contest's close.

Address entries to: MacUser Magazine, c/o Mac II Contest, 950 Tower Lane, 18th Floor, Foster City, CA 94404

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MINIFINDERS



byte and a parallel printer. $149. Orange Micro, 1400 North Lakeview Ave., Anaheim, CA 92807. (Nov '88)

Hard Disk 20SC is Apple's 20-megabyte SCSI hard disk. Reliable, fairly noisy unit. ★★★★ Good utility software, but no back-up yet. Requires cable and terminator ($80). Requires SCSI port, 512K+, new ROM. $1,299. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (Feb '87)

Hewlett-Packard ColorPro Graphics Plotter is an eight-pen desktop plotter that ★★★ requires third-party software to drive it. Fonts are limited to an optional Graphics Enhancement Cartridge that requires some BASIC programming. $1,295. Hewlett-Packard, 16399 W. Bernardo Drive, San Diego, CA 92127. (Feb '88)

HyperDialer provides an interface between a phone and your Mac so you can ★★★½ "dial" a number using one of the Rolodex-type programs, like SideKick, Focal Point or QuickDex. Hooks up between the Mac's sound port and a telephone handset. Requires 128K. MultiFinder friendly. $39.95. DataDesk International, 7651 Haskell Ave., Van Nuys, CA 91406. (Sept '88)

ImageMaker shoots 35mm color slides direct from the Mac. Supports most ★★★★ presentation software. Uses patterns to represent colors. Not fully compatible with the Mac II. Requires 512K+. $4,995. MacDriver software, $149. Presentation Technologies, 743 North Pastoria Ave., Sunnyvale, CA 94086. (Feb '88)

ImageWriter LQ outputs letter-quality text and graphics at 216 dpi. To do so, it ★★½ reduces 72-dpi screen fonts to a third of their actual size. Takes a lot of memory. Printer Driver version 2.0. Requires 1 megabyte and large font sizes. $1,400. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (Jan '89)

IS/ONE tablet with **Penworks** software lets you use a corded or cordless pen or ★★★½ mouse and a high-res tablet for precise graphics input. Minor bugs with some applications and DAs. Keystroke macros can be launched from the tablet. Minimal documentation. Requires 1 megabyte +. $595 to $1145. Kurta, 4610 S. 35th St., Phoenix, AZ 85040. (Jan '88)

Jasmine Direct Drive 50 is a very quiet 1:1 interleave 50-megabyte hard drive and ★★★★★ one of the fastest SCSI drives around. A small fan keeps it cool, but it's still quiet. $1,159. Jasmine Technologies, 555 De Haro St., San Francisco, CA 94107. (Mar '88) ★'87 Eddy

LaserWriter IINT is Apple's mid-priced PostScript laser printer. It's faster than the ★★★ LaserWriter Plus, with blacker blacks. Gray scale is less even than that of Plus. Requires 512K+. $4,599. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (May '88)

Laser Writer IINTX is Apple's top-of-the-line PostScript laser printer. 68020 chip ★★★★½ makes it very speedy; expandable to 12 megabytes; SCSI hard disk can be attached for fonts. Requires 512K+. $6,599. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (May '88)

LaserWriter IISC is Apples's low-end QuickDraw laser printer. Can be upgraded ★★★ to IINT or IINTX; reasonably fast. Requires 1 megabyte +. $2,799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (May '88)

Mac II Workstation is a strong, versatile computer station. Perfect for a Mac II, ★★★★ and units suitable for the Plus and SE are available as well. Main unit, $540. Additional arm, $240; task lights, $80; additional caddy, $75; swap caddy for another size, $45. Shipping not included. Ergotron, 3450 Yankee Drive, Suite 100, Eagan, MN 55121. (Mar '89)

Mac-101 is a keyboard alternative that has a good feel to it. Has a keypad, 15 ★★★★ function keys, and more. The 101-Keys desk accessory lets you define macros. Comes in an ADB version for the SE and II. Requires 512K+. $169.95. DataDesk International, 7650 Haskell Ave., Van Nuys, CA 91406. Software NCP (Apr '88)

Mac-105 Keyboard is a good alternative to Apple's Extended Keyboard, with a ★★★½ larger Return key, higher and more sculpted key tops, and a lower overall weight. Requires Mac SE or Mac II. $179; with QuicKeys, $199. Cutting Edge, P.O. Box 1259, Evanston, WY 82930. (Feb '89)

MacADIOS II is a hardware and software interface for laboratory instruments. ★★★★ Standard configuration samples up to 142 kilohertz. Documentation is sketchy. $1,290 for Macintosh II-ready data acquisition card; $600 for MacADIOS II software interface. GW Instruments, 264 Msgr. O'Brien Highway, Cambridge, MA 02141. (July '88)

MacBottom 45 SCSI and Internal Modem has a modem that fits into the top half ★★★★½ of the 45-megabyte SCSI hard-drive case. Comes with HFS Backup and Eureka. $1,795. Personal Computer Peripherals Corp. (PCPC), 4710 Eisenhower Blvd., Tampa, FL 33634. (Oct '87)

MacBottom HD-21 is a very low (about 2 inches high), external 20-megabyte hard ★★★★★ drive. Fits under the Mac. Very quiet, very reliable. Good utility software, including HFS Backup. Requires SCSI port, 512K+, new ROM. $1,195. Personal Computer Peripherals Corp. (PCPC), 4710 Eisenhower Blvd., Tampa, FL 33634. (Feb '87) ★'86 Eddy

MacBottom HD-70 Hard Disk is an excellent drive that comes with some very ★★★★½ good software, including HFS Backup. Requires SCSI port. $1,995; 1,200-baud Hayes-compatible modem, $200 extra. Personal Computer Peripherals Corp. (PCPC), 4710 Eisenhower Blvd., Building A, Tampa, FL 33634. NCP (Feb '89)

Mac Crate 60MB Hard Disk puts a Seagate drive in a platinum casing. At $14 per ★★★★ megabyte, it's a good consumer value. Also comes in 20-, 40-, and 80-megabyte models. Requires SCSI port. $839. Crate Technology, 6850 Vineland Ave., Bldg. M, North Hollywood, CA 91605. (Nov '88)

MacIntizer is a graphics tablet and absolute positioning device that replaces the ★★★★ mouse. Various scales are possible. $599. GTCO Corp., 7125 Riverwood Drive, Columbia, MD 21046.

MacLarger is a 12-inch external monitor for 512K machines on up to the SE. ★★★ Displays the same number of pixels as an internal monitor, only one-third larger. Bigger and brighter, but less crisp than the Mac's own screen. $449. Power R, 1606 Dexter Ave. North, Seattle, WA 98109. (Apr '88)

MacPacq transforms the Macintosh into a digital oscilloscope, waveform generator, and chart recorder. PacqManager is software expandable via external ★★★ routines in Turbo Pascal and other languages. Version 1.03 reviewed. $995. Biopac Systems, 42 Aero Camino, Goleta CA 93117. NCP (July '88)

MacRecorder is an easy-to-use sound digitizer. Includes software to turn sounds ★★★★½ into HyperCard buttons, mix sounds, add special effects, and convert sound formats. Stereo recording possible on a Mac II. Requires 512K+. $199. Farallon Computing, 2150 Kittredge St., Berkeley, CA 94704. NCP (June '88)

MacSnap Plus 2 is a 2 megabyte memory upgrade for the Mac Plus. The board ★★★★ has 256 kilobit chips. User installable. Not compatible with existing big screens or internal hard disks, and can't be expanded further. $729. Dove Computer, 1200 N. 23rd St., Wilmington, NC 28405. (June '87)

MacTable is an elegant Danish worktable that holds a Mac and printer with room ★★★★½ to spare. The 30-inch deep by 60-inch wide table is made of particleboard and must be assembled. Cabinet is optional. Table, $289; cabinet, $139. ScanCoFurn, P.O. Box 3217, Redmond, WA 98073-3217. (Mar '88)

MacTablet is a stylus-driven graphics tablet. Users can easily sketch or trace art ★★★★ using this absolute-positioning device. Has a working area the size of the Mac screen. Allows concurrent use of the mouse. $495. Summagraphics Corp., 777 State St. Extension, Fairfield, CT 06430. (Jan '86)

MacTilt/MacTilt SE is a Mac (and external drive) holder that allows a full range of ★★★★ swiveling and tilting. Very strong, this well-made unit is also very easy to use. $99.95. Ergotron, P.O. Box 17013, Minneapolis, MN 55418.

MacVision is a digitizer that uses an ordinary video camera for input. Capable of ★★★★ extremely fine results and special effects. Easy to use and well- documented. $349.95. Koala, 269 Mount Hermon Road, Scotts Valley, CA 95066.

Magic Digitizer is a hardware digitizer that works with video cameras. With Laser- ★★★★ Magic software you can generate 300 dpi images (in PostScript). Requires 512K+. Digitizer with Magic software, $399.95; LaserMagic software, $49.95. New Image Technology, 10300 Greenbelt Road, Seabrook, MD 20706. NCP (May '87)

Microtek MSF-300C is a 300-dpi flatbed scanner. Really fast when used with ★★★½ optional MS-SCSI/C adapter. Comes with Versa-Scan Plus software (NCP) to scan and manipulate image. Saves images in a number of formats including TIFF and MacPaint. $1,895. Microtek Lab, 16901 S. Western Ave., Gardena, CA 90247. (Dec '87)

Migent Pocket Modem is a 300/1200 baud portable modem about the size of a ★★★½ 3-x-5 index card. Comes bundled with MacTerm 2.0, Borland's telecom DA. Manual is confusing, and tech support is minimal. $259. Migent, 865 Tahoe Blvd., Incline Village, NV 89450-6062. (Nov '87)

Mouse Mover is a mouse pad-type surface that snaps onto the bottom of the ★★★★½ mouse like a roller skate, freeing it up to glide over desk or mouse pad with ease. 99 tiny ball bearings at three strategic points. Mouse glides faster and saves on mouse wear and tear. $19.95. Magnum Software, 21115 Devonshire St., Chatsworth, CA 91311. ★'85 Eddy

Moustrak is a fabric-covered foam mousing pad. It will increase the efficiency of ★★★★ your mouse while helping to keep it clean. Pad comes in a variety of colors. Particularly useful in the typical office desktop environment. $10. Moustrak, 3047 St. Helena Highway, Saint Helena, CA 94574.

NetModem is a 1200-baud modem that can be accessed by all users on an ★★★★ AppleTalk network. The modem's display lights and the dial tone are simulated on-screen. Requires 512K+. $599. Shiva, Suite 1200, 222 Third St., Cambridge, MA 02142-9919. (Feb '88)

One Plus One is a user-installable memory upgrade for a Mac Plus. Adds 1 ★★★★½ megabyte of RAM to the 1 megabyte already there. Simple one-evening project. Includes MacBreeze, an excellent small fan. Requires Mac Plus. $375. Levco, 6160 Lusk Blvd., San Diego, CA 92121. (Aug '87)

Personal LaserPrinter is a non-PostScript laser printer at a great price. Clumsy ★★★★ workarounds required in some applications. Printing can be slow. Requires 1 megabyte +. $1,999. Fonts Plus, $299. General Computer, 580 Winter St., Waltham, MA 02154. (Apr '88)

Personal Writer PW15 S is a tablet-based handwriting recognition system that ★★★★ also allows graphics and macros. Number of misread characters is too high for general word processing. Requires 1 megabyte +. $895. Personal Writer, 1801 Avenue of the Stars, Los Angeles, CA 90067. Software NCP (Mar '88)

MINIFINDERS

PhoneNET is an AppleTalk-compatible network. Network can be up to 3,000 feet
★★★★★ in length. In-place, unused phone cabling can be used for network, and can be combined with AppleTalk on the same network. $59.95 per node. Farallon Computing, 2150 Kittredge St., Berkeley, CA 94704. (Dec '86) ★'87 Eddy

ProPoint replaces the mouse with an ADB trackball. Works better on the SE than it
★★★ does on the Mac II. Lefties will find the button positions uncomfortable. Requires SE or Mac II. $139.95. Abaton, 48431 Milmount Drive, Fremont, CA 94538. (Oct '88)

QMS Colorscript 100 is the first color PostScript printer that uses a four-color
★★★★ thermal wax transfer technology. Works on AppleTalk. Excellent typographic capability. Currently supports only a handful of applications. Requires 1 megabyte. $21,995. QMS, 1 Magnum Pass, Mobile, AL 36618 (Oct '88)

QMS-PS 810 is an eight-page-per-minute, 300-dpi PostScript laser printer that
★★★½ competes with the LaserWriter IINT. 2 megabytes of RAM is standard; upgradable to 3 megabytes. Emulates HP LaserJet, 7475 (HPGL), and Diablo 630. $5,495. Laser Connection, 7852 Schillinger Park West, Mobile, AL 36608 (July '88)

QuickShare adds a SCSI port to an IBM PC for easy connectivity with a Mac. Can
★★★ use an IBM's hard disk to run Mac applications. Requires SCSI port. Mac II and MultiFinder friendly. Version 1.24 reviewed. $465. Compatible Systems, P.O. Drawer 17220, Boulder, CO 80308. (June '88)

Radius Accelerator 25 can make your Mac SE run 50 percent faster than a Mac II.
★★★★★ The add-in accelerator card has a Motorola 68020 CPU that runs at 25 megahertz, and an optional 25 megahertz 68881 math coprocessor. $1,695; $2,195 with optional 25-megahertz 68891. Radius, 404 East Plumeria Drive, San Jose, CA 95134. (Oct '88)

SpeedCard is an accelerator board for the Macintosh SE that more than doubles
★★★★½ the speed of most applications. The board uses the 68000 chip found in the SE and an optional floating point 68881 chip for number crunching. Requires Macintosh SE. $399; $699 with coprocessor. SuperMac Technology, 295 North Bernardo Ave., Mountain View, CA 94043. (Nov '88)

SuperRam 2 and SuperRam 4 are 2- and 4-megabyte RAM upgrades. Should be
★★★½ dealer installed but can be (carefully) user installed. SuperRam 2 includes RAM adaptor module, 1-megabyte memory module, modified power cable, jumper and fan. SuperRam 4 adds power supply booster and two 1-megabyte memory modules. Not compatible with most big screens. $499. SuperMac Technology, 295 N. Bernardo, Mountain View, CA 94043. (Oct '87)

Tektronix 4693D Color Printer is a 300 dpi bit-mapped color printer. Colors look
★★★★ smooth and rich. Uses bit-mapped screen fonts; most type has noticeable jaggies. Requires Mac II with color monitor. Recommended 8-megabyte configuration, $11,490. Tektronix, P.O. Box 500, Beaverton, OR 97077. (Oct '88)

ThunderScan replaces the ribbon cartridge in an ImageWriter, which is required to
★★★★ use it. Laser scans art that can be run through the ImageWriter, producing high-quality digitized images. The images can be manipulated as they are created or afterward. $249. Thunderware, 21 Orinda Way, Orinda, CA 94563. ★'85 Eddy

TimeWand is a bar-code reader with a built-in time/date stamping clock. Can
★★★★ be used with TimeWand Manager software, a database that's extensive though difficult to use. Poor docs, but good support. Requires 1 megabyte +. TimeWand 2K version, $198; TimeWand Manager, $489. Videx, 1105 N.E. Circle Blvd., Corvallis, OR 97330-4285. (Dec '87)

Turbo Mouse ADB makes an excellent mouse replacement, even if you're not a
★★★★★ trackball fan. If you're seeking absolute control, you can buy the optional cdev that enables you to specify custom tracking and double-click speeds. $169.95; cdev $15 direct order only. Kensington Microware Ltd., 251 Park Ave. South, New York, NY 10010. NCP (Feb '89)

TV Producer is an add-in card that overlays Mac graphics and text onto a video
★★★ signal. Software is clumsy to use. Requires Mac II, Apple video card, and video souce. $599. Computer Friends, 14250 N.W. Science Park Drive, Portland, OR 97229. Software NCP (May '88)

V-series Smartmodem 9600 is the fastest modem you can get for the Mac. To
★★★★½ achieve high speeds, you'll need a special cable and software that supports the format. Requires 512KE, Mac-to-modem cable, and communications software. $1,299. Hayes Microcomputer Products, 705 Westech Drive, Norcross, GA 30092. (Jan '89)



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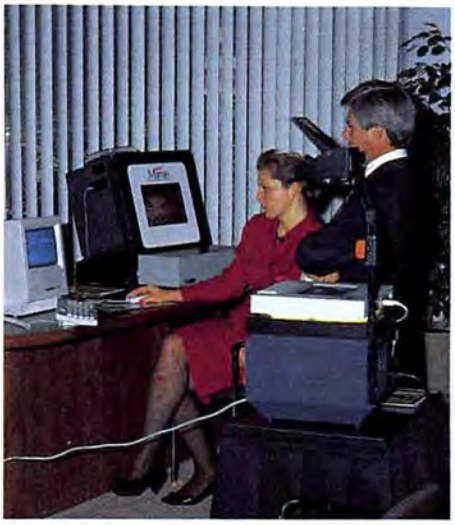
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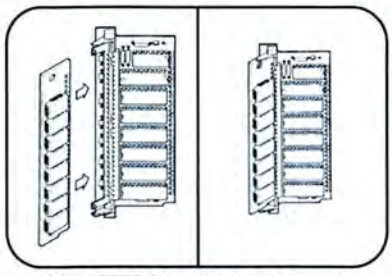
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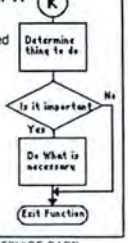
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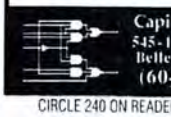
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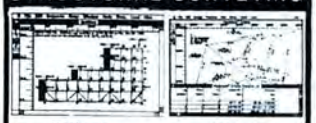
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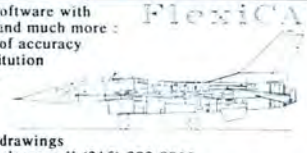
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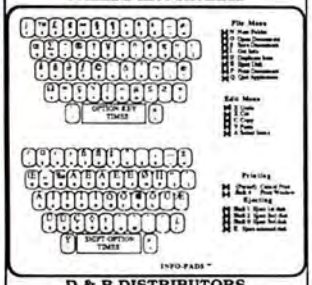
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1. Please indicate which of the following computers you currently use in your company or organization: (check all that apply)

- ☐ a) Mac Plus
- ☐ b) Mac SE
- ☐ c) Mac II
- ☐ d) IBM PC
- ☐ e) Other

2. For how many micro computers do you buy products?

- ☐ f) 1-4
- ☐ g) 5-49
- ☐ h) 50+

3. Your primary job function is: (check one)

- ☐ i) Administrative/General Management
- ☐ j) MIS/DP, Communications Systems, Programming
- ☐ k) Engineering/R&D
- ☐ l) Finance/Accounting
- ☐ m) Marketing/Sales
- ☐ n) Computer Dealer/VAR

4. For which of the following products are you involved in selecting brands/models to be bought by your company or organization? (Check all that apply)

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- ☐ o) Accounting
- ☐ p) Spreadsheets/ Financial Planners
- ☐ q) Project Managers
- ☐ r) Word Processors
- ☐ s) Database Managers
- ☐ t) Graphics
- ☐ u) CAD/CAM
- ☐ v) Communications

HARDWARE
- ☐ w) Mainframe
- ☐ x) Mini
- ☐ y) PC
- ☐ z) Printers/Plotters
- ☐ 1) Monitors
- ☐ 2) Disk/Tape Back-up
- ☐ 3) Add-in Boards
- ☐ 4) Communications

5. Are you involved in the purchasing of microcomputer equipment at your company?

- ☐ 5) Yes
- ☐ 6) No

6. If so, what function do you serve in the buying process?

- ☐ 7) Evaluations/Specification
- ☐ 8) Recommendation
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SCRaPBOOK

EDITED BY KRISTI COALE



MAC ON THE STREET

Chris Crawford of San Jose, Calif., writes: "Here's what the world really needs: software that lets a laser printer emulate a 7-pin printer, thereby allowing laser printer owners to avoid embarrassment when sending letters to their less-fortunate correspondents." Chris, as you may know, is a game programmer (Trust & Betrayal) and a devotee of global economics (Balance of Power); after digging up my old Econ 101 textbook, I realized this printer idea could be traced to Thorstein Veblen's writings on inconspicuous consumption and The Theory of Leisure Suit Larry.

In *his* leisure time, John Yeh of Honolulu discovered a hidden screen in Nashoba's FileMaker 4. To find this prehistoric artifact, press Option when you click the About box.

There's nothing hidden about the Unexpected Error message Henry Linton of Wilmington, Del., ran into one day in HyperCard. Is this, he wonders, in contrast to the *expected* errors one normally encounters in HyperCard?

More great expectations: People who buy word processors sometimes write about computers. But spelling checkers don't know this; they don't have any of the jargon of Silicon Valley in their dictionaries. Robert M. Tarabella of Palm Beach Gardens, Fla., wanted to see if the new spell checker for Works 2.0 practiced what it preached. He ran the Works ReadMe file through the spell checker and got 97 suggestions, including "Lasciviousness" for "LaserWriter," "Applesauces" for AppleShare, and "Multifariousness" for MultiFinder. (Maybe they're on to something.) In any event, Working Software — the creators of Works' dictionary — has a business dictionary in the works. (It sure would be nice if we didn't have to keep looking up which *e* to accent in Gassée.)

There's a multifarious trend underfoot: As soon as a high-powered software package begins to saturate the market, the publisher releases a scaled-down budget version of the program to broaden the potential audience. Microsoft's Word devolved into Write, QuarkXPress begat QuarkStyle, and Passport's Master Tracks Pro was truncated into Master Tracks Jr. Well, Michael Trigoboff of MLT Software may have stumbled onto the cause of this trend. Browsing through an ad from software discounter 47th St. Photo in a recent *New York Times*, Michael spotted an ad for Symantec's "Lightweight C" language. (Maybe only the full-bodied versions get the Light*speed* C treatment.) If the Lightweight series of programming languages catches on, watch for future emasculated programs: low-rent page layout programs like Letraset's Ready, Set, Pause!, spreadsheets like Lotus 1-2, a new networking package called SOSO (from the new Sun Microsystems company of the same name), and our favorite game from Casady & Greene, Rhinestone Quest.

Felix Dupont of Rockville, Md., recently set out on a quest of his own. He saw the Jasmine hard-disk drive ad on page 256 of our December '88 issue, and just had to have one. No, not the hard-disk drive, but the power briefcase that Guy Kawasaki uses to tote his Jasmine drive. For power users on the go, Felix tells us it's a Halliburton, and you won't find one at K-mart. The 3-inch Bordeaux model pictured lists for $415.

Here's your chance to make a brief case about our very own anti-editor, John Dvorak. As the 17th century French poet/philosopher Renée Doubilard put it, "It is easier to mimic that which we despise than to despise that which we mimic." We don't know what he meant, either, but it gives us the chance to announce the first John "I Can't Believe You Really Pay Him to Write That Stuff" Dvorak Write-Alike contest. If you feel he needs a piece of your mind, send us your Dvorakesque diatribe on the Mac-related topic of your choice. The best entries will be published in a future issue. Keep it short and, if this isn't a contradiction in terms, sweet.

Here's a contradiction in terms of endearment. We received a letter from Mark Smith of Hampton, N.H., that began "Dear MACazine . . . ." We'll plug his software here anyway: Mark has compiled a database of over 6,500 military and electronics acronyms, available in both Excel and Works formats. Contact Heizer Software Exchange, 1941 Oak Park Blvd., Pleasant Hill, CA 94523; (800) 888-7667 or (415) 943-7667.

FYI, we will happily intercept correspondence intended for any nationally circulated magazine. Send your observations, Dvorak Humoresques, and trade secrets to Mac on the Street, c/o *MacUser*, 950 Tower Lane, 18th floor, Foster City, CA 94404.

— *Jon Zilber*

PHOTOS: PETER A. GOULD

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Affordable Macintosh Publishing

In the past, Macintosh users had to choose between printers they could afford and output that looked good. Laser quality, previously out of reach, is now available to everyone regardless of his budget. The new DeskJet 300 DPI printer from Hewlett Packard provides the solution.

With a retail price of only $995, the DeskJet offers quality matching that of the Apple LaserWriter IISC, at a cost below that of the ImageWriter LQ. At only 14 lbs., the DeskJet easily follows you to where the work is. Additional features include easy front paper loading, affordable and convenient ink cartridges, and envelope printing. If you need top quality output for the home, school, or small business, the DeskJet delivers.

The DeskJet and the Grappler LS

Until recently, the only problem with the DeskJet was that it didn't work with the Mac. Now the Grappler LS printer interface provides a complete solution, allowing the DeskJet to print from the Macintosh at a professional 300 DPI. Now your letters, homework, proposals, and every document you produce can have that laser quality desktop publishing look.

Quick Draw Printer	Resolution	Price
Apple LaserWriter IISC	300 DPI	$2,799
Apple ImageWriter LQ	216 DPI	$1,399
Hewlett Packard DeskJet	**300 DPI**	**$995**
Apple ImageWriter II	144 DPI	$599

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The Grappler LS is the latest Macintosh interface solution from Orange Micro. The Grappler LS connects the HP DeskJet or any HP compatible serial laser printer to the Macintosh Plus, SE, or II and drives it at its full 300 DPI resolution. To achieve this, the Grappler uses a standard Apple printer driver and translates the output for your printer, allowing compatibility with hundreds of popular packages.

The Grappler LS comes complete with cabling, spooling software, and 3 fonts families (Times, Helvetica, and Courier look-alikes). Look for the Grappler LS and other Orange Micro products to bring the best printing solutions to you and your Macintosh.

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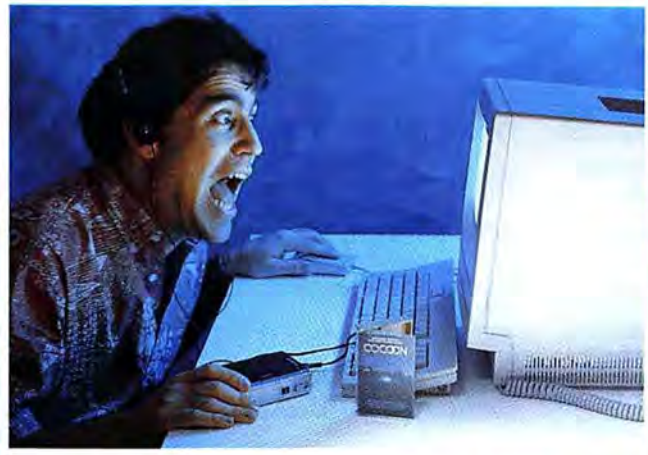
Who says the best advice is never given? Right here in the very pages of *MacUser,* you the reader can offer free advice to other readers anxious to take it. Whether it's good or not is another story. Nonetheless, we'll give you a forum from which to enlighten right here. If you have a tip for your fellow Mac users or some startling revelation, feel free to share. Just send your tip to Bright Ideas, c/o *MacUser,* 950 Tower Lane, 18th floor, Foster City, CA 94404. Sharing can be profitable, too; if we use your pointer, you'll be $10 richer. What more could you ask for?

TALKIN' BOUT MY SIMULATION

For a real blast of audio-visual stimulation, try this:

Run Orion, the Space Flight Simulation found on many BBSs, with the lights turned off while listening to the soundtrack from the motion picture *Cocoon* on your Walkman. If you thought that space flight movie scenes were impressive, wait until you get to ride your own "score!" You'll get goose bumps as you approach a new solar system and crescendos and ruffles show up on your Walkman. You could also try to recreate *2001* by playing "The Blue Danube," but that's another era. [*You can experience a similar trip by playing Falcon while listening to Pink Floyd's* Dark Side of the Moon. — *Ed.*] Too bad Orion and the *Cocoon* soundtrack aren't bundled together.

PAUL GONSALEZ
JACKSONVILLE, ARK.





STATIC ATTRACTION

Do you sometimes feel like you're peering through miles of smog to read your spreadsheet? Dust and smoke particles are very attracted to your Mac's screen. An easy and inexpensive way to reduce this problem is as close as your nearest clothes dryer. Those fabric softener sheets people use to reduce static on their clothing are still useful after a spin in the dryer.

Just grab a used one from your dryer and gently apply it to your Mac's screen. Not only will you notice that the dust doesn't accumulate nearly as fast but also how fresh and clean your Mac smells.

RON FOSTER
SANTA CRUZ, CALIF.

HIT LIST

Ah, November. The Christmas buying season had just begun, and Egghead Discount Software boasted these top sellers:

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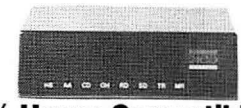
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SCRaPBOOK

YOU MAKE THE CALL

As the Mac has matured, so have its entrepreneurs. They've realized that what P.T. Barnum said a century ago still stands today, "There's a sucker born every minute." In keeping with these sentiments, we're presenting you with a few efforts from these plutocrats to let you judge whether or not they're what you'd want in a product. You make the call.

This Diskette Ejector could come in handy when you need to get a diskette out of your Mac or when you're too lazy to drag the icon to the trash. Platinum



colored, this little gem won't clash with your Mac's color scheme. It even comes with an adhesive strip, so you can slap it right on the side of your computer. Great idea, huh? I guess you could call it reinventing the paper clip for profit.

Here's an item that, for the moment, comes free with every purchase of a box of diskettes. Some people might call them dust covers for the diskette. Still others, like Dr. Victor Technicado of Melbourne, Fla., refer to it as a virus prophylaxis — that's right, diskette condoms. Dr. Technicado insists that they provide 100 percent protection against virus



transmission to your hard disk, though they might damage your floppy drives. Dust cover or diskette prophylaxis? You make the call.

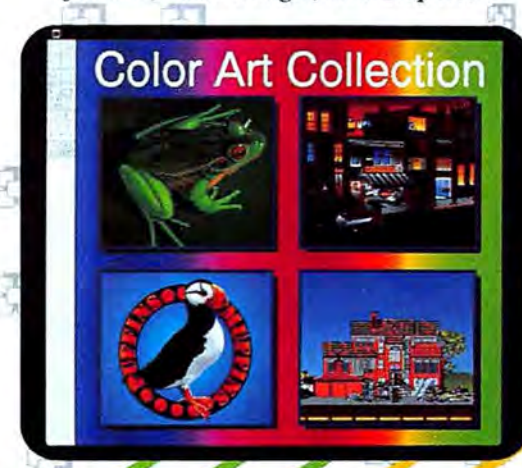
A certain manufacturer who advertises in our magazine, among others, has a HyperCard-based product that may very well be "The Most Incredible Totally Integrated Hyper Relational Application," and "Absolutely The Greatest Value Ever." Judging from the packaging, it certainly is an extravaganza, what with a "Partial Feature List" including 39 features, the 39th being "And Much, Much More!!!" But you have to wonder if these guys really believed that HYPE stood for HyperCard when they came up with their phone number, (800) 888-HYPE. Again, you make the call.

— Kristi Coale



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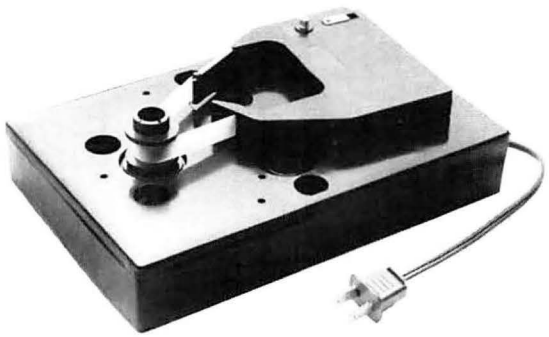
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SCRaPBOOK

PHILE PHORMATS

RIFF, TIFF, and PICT. What are these, anyway? Well, if you paid attention to the previous pages in this magazine, you might know the answer. If you've been attentive, you'll know RIFF is a solo section within a song and that TIFF and PICT refer to a particular unpleasant demeanor — being PICT off, or having a TIFF with someone. And if you really read the magazine, you'll know we're kidding here.

Actually, these are file formats. No kidding. And imagine our shock when we discovered that we had completely overlooked the formats below, and far too close to deadline to cover them properly. Fortunately, we were able to displace the Laptop Mac article in this section to bring you this important information. Do try to pay attention here. You might be tested later.

STIF: Structured Tagged Image File. No longer widely used. Based on industry trends, it appears that it will soon be a dead format.

SNIFF: Sharable Neutral Interface File Format. Developed by Dr. Lyle Scratchen of MIT. Known in graphics circles as the Scratchen SNIFF.

SKIFF: Sequence-Keyed International File Format. Based on floating-point numbers, it's eminently suitable for transoceanic file exchange.

GARBL: Globally Acceptable Redundant Bit List. Suitable for transmission over standard phone lines without appreciable degradation. Suitable for transxission ovyr standarg phine lines without apprdciabgle degradrtion. Suitrble for trgnsfissrri . . .

STUFF: System Transferrable Uncompressed File Format. By far, the most generic of all formats. Based on a survey of filenames on 100,000 Macs, there's a trend toward global acceptance.

JUNK: Jumbled Unformatted Never-Knowable. All file formats can be easily converted to this. It's fairly easy to write, but harder to read. The eventual state of all stored data.
— *Salvatore Parascandolo*

DO YOU KNOW ME?

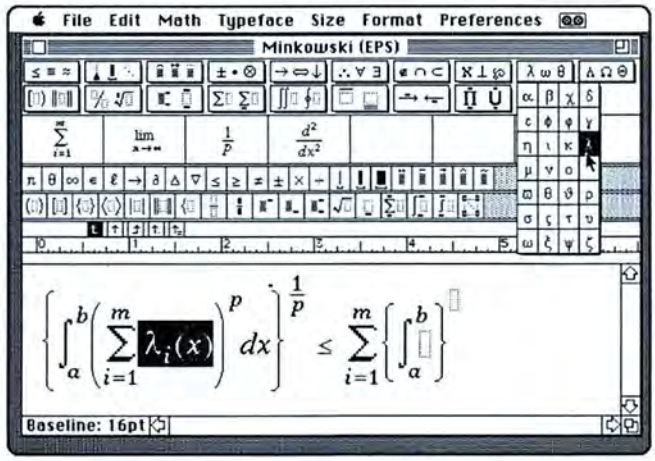


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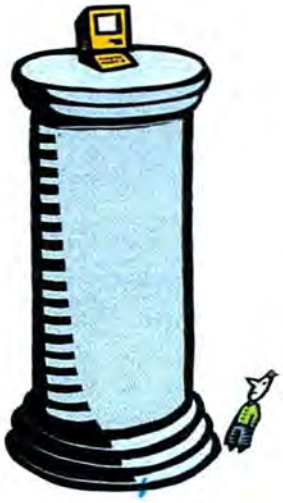
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THE DEVIL'S ADVOCATE



ROBERT ZIMMERMAN

Booster Shots

Will Macintosh users forever be defensive and worried about their image? Do they need constant boosterism and reminders that they did the right thing when they bought a Macintosh in the first place? A quick survey of all the Mac magazines, a look at columnists, editorials, and letters to the editor soon reveals this to indeed be the case.

Let's look at last December's issue of *MacUser*, a nice fat magazine. In the editorial, our illustrious editor-in-chief, Fred Davis, practically swooned as he waxed eloquently about the Mac. Hasn't he waxed eloquently enough already? He calls the machine "the best computer for molding information" — whatever that means. He then goes on to tell us about all the wonderful Mac software and all the wonderful things one can do with a Mac. Can it, Fred.

Moving to the letters to the editor — still we hear praise for the Mac. Now to the columns. Neil Shapiro is the leadoff hitter. His theme is not the Macintosh (this time) but the crummy Macworld Expo in Boston. He moans and groans about it. Just to make sure he stays in good stead with the Mac community, though, out of the blue he throws gratuitous nosegays at the Mac. "I'm probably as excited about the Macintosh as the next guy, even if I'm seated next to Jean-Louis Gassée." Name-dropper.

Next we get to Jim Seymour. He's one of those converted PC users. You know the type. The worst. Like a guy who quit smoking. In this column Jim debunks all the nasty and bad things people say about the Mac when compared with an MS-DOS machine. The fact is, the reader of *MacUser* already knows all the reasons a Mac is as good as an MS-DOS machine. So who is the column written for? Yes, it's written for the readers who can't get enough boosterism.

Onward. Robert Wiggins actually does a column where he doesn't pander (too much) to the Mac lover. He discusses "The Many Faces of Apple" and how the company needs to unify its image. Nowhere does he say "I love the Mac," or, "As we all know, the Mac is the world's greatest machine." I was stunned by this and expect he'll receive numerous nasty letters. Robert made up for this flaw by writing a feature story in the same issue on presentation graphics, in which he humbugged articulately about the capabilities of the machine. After reviewing some *fabulous* software for this *phenomenal* machine, he concluded, "Whichever one you choose, you'll end up with a winner." Gag me.

We move to Michael Swaine, former editor of *Dr. Dobb's Journal of Software Tools* and micro maven from way back. Somehow he's become enamored with HyperCard and is devoting his life to it. He writes a column about its every idiosyncrasy as if he were a psychiatrist dealing with the three faces of Eve. Would someone please throw a bucket of water on this guy?

We haven't even discussed the ex-*MacUser* columnists such as Steve Bobker and Doug Clapp who, together, have created entire new genres of brownnosing and pandering. Meanwhile, the readers eat it up. They can't get enough. Talk about people who are insecure.

It's apparent to anyone who took one lone sociology course that the roots of fascism are present in this community. I'm always chided by my coworkers at *PC Magazine*, where I do most of my work, about all the Macintosh magazines, including this one. "Aren't those people ever critical of *anything?*" they ask. I have to explain that this Macintosh community is a family of well-wishers. Smiling faces. "Kind of like Jonestown," I say.

The problem boils down to the one-vendor syndrome. Without clones or competition, how can one be critical? It's like a one-party political system. How can you criticize the boss when there is nowhere to run, no alternative? Apple has always had this advantage in the marketplace. The alternative to a Mac is no alternative if you like the Mac in any way. It was the same with the old Apple II. What this means is that the engineers and users are dependent on Apple's goodwill for them to continue to exist as engineers and users. No such dependency exists outside of the Apple camp.

Since this situation is inherently uncomfortable, constant soothing and reassurance are necessary. Mac users and the hapless engineers at Apple must be steeped in this boosterism that I cited above and that you see all around you. It's the users who have chosen to live this life. They, in essence, demand the boosterism and flag-waving. They have sacrificed the intellectual freedom to be critical just so they can comfortably use one specific brand of computer. The forced loss of objectivity has been chosen as the lesser of two evils. The alternative is to fight city hall. In this case, city hall is like the Chinese Cultural Revolution and the user community is like a united cadre of disciplined figures in blue pajamas waving little red books. None of the believers is interested in hearing some guy complain, especially against the Chairman.



While this all works out fine for Apple and the bottom line, someday things will swing the other way, and Apple will zig when it should have zagged. It will ask the community of drones what happened, why they didn't let Apple know that it should have zagged. And all the community will be able to do is quote meaningless aphorisms.

BY JOHN C. DVORAK

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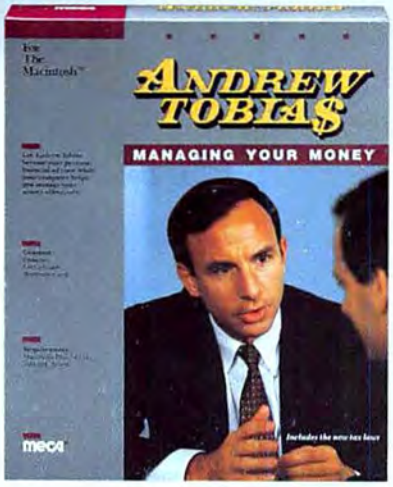
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